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A NOTE ON THE EARLY APPEARANCE OF SOME SPECIES OF MACROLEPIDOPTERA (HETEROCERA)

The very fine spring of 1961 induced a number of species of Heterocera to appear at dates much earlier than in normal years. During the months of February, March and April several species were taken up to a month earlier than previously recorded from the same locality. All these records are from a mercury vapour light trap at Whetstone, Hertfordshire, and are listed below in order of appearance:

Orthosia gothica L., 11th Feb.; *Orthosia stabilis* Schiff., 28th Feb.; *Gymnoscelis pumilata* Hübn., 26th March; *Ochropleura plecta* L., 2nd April; *Harpyia bifida* Brahm, 11th April; *Abrostola tripartita* Hufn., 13th April; *Caradrina clavipalpis* Scop., 15th April; *Apatele rumicis* L., 18th April; *Hadena trifolii* Hufn., 19th April.

P. H. WARD.

Dept. of Entomology,
British Museum (Natural History).

ENTOMOLOGICAL HAZARDS

By ELIZABETH E. HARPER

The strange, the unexpected, the bizarre are I suppose the usual and the commonplace situations to most entomologists' wives. Still, looking back on a far from dull life I can well understand why our entomologist husbands, boy friends, or relations are regarded by the rest of the world as a trifle eccentric, if not odd! They have a flair, if I may say so, for sailing into the most unusual situations. Of the oddity of these they seem unaware, or completely uncaring. Lairds, gamekeepers, wardens and police are their natural enemies until convinced at last of their innocence. The process is fraught with complications, if not danger, and usually needs a good deal of sorting out.

I have, I think, always tended towards conventional behaviour. My husband, alas, has no such inhibitions, and being an entomologist makes him worse! One fine spring day he disturbed a love-making couple in a Sussex wood. Did he retire discreetly? Not a bit of it! With old-world courtesy he politely raised his hat to the somewhat abashed young woman and said, 'There is a rare moth on your bottom, pray allow me'. He then deftly boxed a fine fresh specimen of *Colocasia coryli* L. and bore it home in triumph! I expect that the poor girl was far too alarmed to say no, especially as he was armed with an open beating tray, heavy stick, and kite net. She must have thought at least that she was at the mercy of an escaped lunatic, or the current uncaught Sussex murderer. Meanwhile, her erstwhile lover had unchivalrously fled from the foot of the fine old oak tree, from the trunk of which, doubtless, *coryli* had been rudely disturbed.

At the end of the last war we possessed an ancient Armstrong-Siddeley car not unlike a hearse in appearance. Those were the days before the advent of mercury vapour lamps and generators, and entomologists usually went out at night with a paraffin Tilley lamp, matches and methylated spirits, a miner's electric head-lamp, and like equipment. I need hardly mention beating trays, larva tins, glass-bottomed boxes, and treacle. Any entomologist's wife is used to such trifles and takes them in her stride. She is also used, on a warm damp night, to see the light of battle come into her husband's eye. She knows that the chase is on, for the elusive females (moths of course), and that on such a night she is doomed to grass-widowhood.

'On such a night as this' (to quote), I saw the familiar look in my husband's eye. I helped to get ready all the paraphernalia, saw him off, kissed him good-bye, and wished him luck. I usually ask him where he is going, and then inform the police; otherwise alarmed householders inevitably call them out. This night for my sins I thought it unnecessary, as he was in the good, responsible company of a young doctor friend, and the medical fraternity can deal with most situations. With these comfortable reflections I followed my usual practice and retired to bed with a book.

It was well after midnight when the telephone rang. It was downstairs in a very cold dining-room. However, fearing the worst I donned my warmest garments and went to answer it. A strange male voice asked if I was myself, and I answered in the affirmative. He then enquired if I had lost an Armstrong-Siddeley car No....., etc. I might have known this, I thought. Two men, it appeared, had left the said car outside his house and, carrying bright lamps, etc., had departed to a neighbouring marsh. He had phoned the police, phoned me, his wife was most upset, most upset, in fact she was having hysterics! Patiently I explained who my husband was, what he was doing, the name of his companion, and even the rudiments of nocturnal entomology, and that men who were engaging in nefarious activities at that hour would hardly do so openly and carry 300-candle-power lamps as well! He seemed unconvinced and, I suppose, looking back on it I can hardly blame him. He reiterated, 'Well, I've sent for the police, and my wife is having hysterics'. Completely fed up by now, I retorted, 'My dear sir, I suggest that you send the police away and pour cold water over your wife'. I slammed down the receiver and went back to bed. My husband arrived home not long after, having been not one whit abashed by finding the entire force of the local crime squad leaning on the bonnet of the old Armstrong! The whole affair, he told me, had passed off quite amicably, the police having told the householder that they knew him quite well, and that he was harmless. I have never known my husband to be in the least disconcerted when, it seemed to me, that he was facing arrest or worse.

Now I am not made of the tough stuff of our entomological men-folk. I have only to go out at night and hear the curt voice of authority enquiring what the . . . we think we are doing, to wish that I was almost anywhere else, especially back in my warm bed! Sometimes I wonder, as all wives must have done, if we really knew what marrying an entomologist entailed.

Daytime adventures must be taken in one's stride. We were wandering through the streets of Littlehampton one morning when my husband, as it seemed to me, suddenly went mad. He knocked at the door of a small house in a small street and insisted that he must at once go up to the occupier's front bedroom! Not unnaturally the family were extremely suspicious. I was, to put it mildly, rather embarrassed, and remained downstairs to explain that a fine moth, perhaps a rarity, was hanging from the upstairs window-sill. In the end it was only, I believe, *P. meticulosa* L., and we parted amicably.

I well remember our departure for the Isle of Wight on an unexpected week-end. We were myself, my husband, my son, one very large dog, and a pound of very smelly dog meat. I thought that I had packed everything and assembled all the entomological gear. My son was then a small boy of prep. school age, and I was just wondering whether we should catch our train and where he was and whether his hands and face were clean, when he appeared. He was far from

clean and tidy, but triumph was written all over his face. He had just captured a female *N. polychloros* L. and it might lay eggs. I suppose that I had not then the experience of entomology that I now have, so I think that I just gazed at my husband and son and asked rather dazedly, amid the mounting excitement—'Do you really mean that we have got to take that thing with us?'—to be told, with masculine exasperation, 'Of course; don't be so stupid!' I watched with fascination while the lady *polychloros* was prepared for the journey and her future maternal duties in a large breeding cage, with food-plant and everything to make her comfortable. So we departed, and by a miracle caught our train and ship with all our impedimenta. We had a wonderful week-end, crowned by the lady, who laid a beautiful bracelet of eggs. We all returned in triumph when the week-end was over, and I felt that marriage to an entomologist was quite simple. Famous last words, I suppose!

UNUSUAL EMERGENCE OF *ANTHOCHARIS CARDAMINES* L. (LEP.)

In the hope that it may be of some interest, I should like to record the following unusual emergence of *Anthocharis cardamines*.

Four larvae were found by Mr. N. T. Easton in his garden at Mortimer, Berkshire, on 18th June, 1959. Three were feeding on Sweet Rocket (*Hesperia matronalis*), and one on Jack-by-the-Hedge (*Sisymbrium alliaria*). They were promptly caged, and within a week all had pupated. The pupae were then transferred to a pill box lined with cotton wool and left in an unheated room in his house for the winter.

In April they were transferred to a larva cage in his study. When they had still not emerged by the end of June he rather naturally assumed they were dead, and gave them to me thinking they might be of interest to my small son, also a keen entomologist.

For some reason I put them into my outdoor larva cage and proceeded to forget all about them. I was therefore not a little surprised to find a freshly emerged female in the cage on the 1st October, 1960. She has been compared closely with the other normal specimens in my collection and I can detect no difference whatsoever.

Apart from being kept indoors for twelve months as a pupa, which if anything tends to accelerate development, the rest of her life was spent under normal outside conditions. It is therefore interesting to speculate whether the emergence date would have been very different had the larva never been found.

A. R. DAVEY.

*Hillside, Hatch Lane,
Hucklebury.*

CADRA WOODIELLA R. & T., A SYNONYM OF
C. PARASITELLA STAUD. (LEP., PYRALIDAE)

By PAUL E. S. WHALLEY

Department of Entomology, British Museum (Natural History)

A series of specimens of a Phycitid moth belonging to the genus *Cadra* Walker (formerly known as *Ephestia* auctt., Whalley, 1960) was recently submitted to me for identification by Mr. D. Ffennell. These moths had been collected over the period 1956-60 in Winchester, Hampshire. The series represented a gradation between *C. woodiella* Richards & Thomas and *C. parasitella* Staudinger.

In order to clarify the identity of these specimens, I compared them with the original series of *woodiella* and with three specimens of *parasitella* from the Staudinger collection, labelled 'Origin'. No holotype had been designated for *parasitella*, so I selected as lectotype a male, probably the one in the original description. This specimen I have labelled '*Cadra parasitella* Staud., lectotype, det. P. E. S. Whalley, 1961, Slide No. 6600', specimen and slide in the Zoological Museum, Berlin.

Comparison of the Staudinger material, the Ffennell series and a series of *woodiella* has shown that they are all conspecific. There is a gradation between specimens of *parasitella* from Spain (the type locality) and the specimens from the rest of Europe and the Middle East. The costal spine on the valve of specimens from Spain is smaller than that of specimens from the rest of Europe.

Cadra woodiella Richards & Thomson (1932) must therefore be regarded as a junior synonym of *C. parasitella* Staudinger (1859). When more is known of the biology and variation of this species, it may be possible to delimit subspecies, but for the moment insufficient material is available.

I am indebted to Dr. H. J. Hannemann for permission to dissect the original Staudinger material in the collection of the Berlin Museum. I am also grateful to Mr. W. H. T. Tams, who has examined the material and expressed his agreement with the findings.

REFERENCES

RICHARDS, O. W. & THOMSON, W. S., 1932. *Trans. ent. Soc. London*, 80:169-246.

STAUDINGER, O., 1859. *Stett. ent. Ztg.*, 20:226.

WHALLEY, P. E. S., 1960. *Ent. Gaz.*, 11:183.

PARASEMIDALIS ANNAE (ENDERLEIN, 1905) A SYNONYM
 OF *P. FUSCIPENNIS* (REUTER, 1894)
 (NEUROPTERA: CONIOPTERYGIDAE)

By P. H. WARD

Dept. of Entomology, British Museum (Natural History)

In the course of a survey during 1959 and 1960 of insects collected in a mercury vapour light trap at Whetstone, Hertfordshire, a number of Neuroptera were encountered. These included thirteen males of the species hitherto known as *Parasemidalis annae* (Enderlein). On closer examination of this series a considerable amount of variation was apparent in the venation, ranging from that which is typically *P. annae* to that as described for *Parasemidalis fuscipennis* (Reuter). Some of the intermediates were asymmetrical and exhibited the venation of both species. The genitalia of all thirteen specimens were constant and conformed perfectly with the figures of the genitalia of *P. annae* given by both Withycombe and Killington.

P. fuscipennis Reuter (1894, *Acta Soc. Fauna Flora fenn.*, **9**(No. 8): 13) was first described from Finland from a solitary female. *P. annae* Enderlein (1905, *Wien. ent. Ztg.*, **24**: 198) was also described from a solitary female, this time from Germany, and was separated by Enderlein entirely on venational and colour differences. Withycombe (1922, *Entomologist*, **55**: 169) stated that he thought it highly probable that the two species were one and the same. Esben-Peterson (1929, *Netvinger og Skorpionfluer, Danm. Fauna*, **33**) synonymized the two species. Killington (1936, *British Neuroptera*, **1**: 212) stated that it was probable that *P. annae* would prove to be the same as *P. fuscipennis*, but that he would regard them as distinct species until it was possible to examine the genitalia of the types. Later, Tjeder (1941, *Ent. Tidskr.*, **62**: 25) wrote supporting Esben-Peterson.

The result of the examination of the material mentioned above seems to leave no doubt that *P. annae* is no more than a synonym of *P. fuscipennis*. It therefore seems best to accept this synonymy until examination of the types can prove it one way or the other. The types are at present inaccessible.

EARLY LEPIDOPTERA RECORDS IN 1961

Lampropteryx suffumata Schiff. (Water Carpet) on 14th April, *Stauropus fagi* L. (Lobster) on 18th April, *Laothoe populi* L. (Poplar Hawk), *Laspeyresia succedana* Schiff. (*ulicetana* Haw.) and *Adela viridella* Scop. on 19th April; all in the Chiddingfold area.

R. M. MERE.

*Mill House,
 Chiddingfold, Surrey.*

ON THE SYNONYMY OF *ANACAMPSIS POPULELLA*
 (CLERCK) AND *A. BLATTARIELLA* (HÜBNER)
 (LEP., GELECHIIDAE)

By KLAUS SATTLER *

Zoologische Staatssammlung, Munich, Germany

While studying the synonymy of *A. populella* (Cl.) it was found that Hübner (1796), under the name of *blattariella*, figures the birch-feeding species, now generally known as *A. betulinella* Vari. Hübner's name being the older has to be re-established. References are given below to the synonymy and the most important figures of moths and genitalia.

***Anacampsis populella* (Clerck, 1760)**

1. *Phalaena populella* Clerck, 1760, *Icon. Ins.*, pl. 11, Fig. 5. (The figure is not good, but by the name it is evident that Clerck means the poplar-feeding species.)
2. *Anacampsis tremulella* Duponchel, 1838, *Hist. Nat. Lep. Fr.*, **11**: 272, pl. 296, Fig. 5. (On the plate this species is erroneously named *fuliginosella*!).
3. *Anacampsis populella* Cl., Duponchel (part.), *l.c.*, pl. 296, Fig. 4. (Fig. 2 in the same work belongs neither to *populella* nor *blattariella*!).
4. *Phalaena laticinctella* Wood, 1838, *Index Ent.*, pl. 38, Fig. 1188.
5. *Anacampsis populella* Cl., Vari, 1941, *Tijdschr. v. Ent.*, **84**: 352, pl. 1, Figs. 5-8.

Genitalia:

1. Pierce & Metcalfe, 1935, *Genit. Brit. Tin.*, pl. 11 (♂, ♀).
2. Busck, 1939, *Proc. U.S. Nat. Mus.*, **86**, pl. 63, Fig. 29 (♂); pl. 71, Fig. 64 (♀).
3. Vari, 1941, *Tijdschr. v. Ent.*, **84**: 352-3, Fig. 2 (♂); Fig. 4 (♀).

Larva feeding on poplar and willow.

***Anacampsis populella* (Clerck) ssp. *fuscatella* (Bentinck, 1934)**

1. *Tachypitia populella* Cl. ssp. *fuscatella* Bentinck, vi., 1934, *Tijdschr. v. Ent.*, **77**: xxii.
2. *Tachypitia populella* Cl. f. (ssp.) *ambronella* Meder, 10.xii.1934, *Schrift. Naturw. Ver. f. Schlesw.-Holst.*, **20**: 362. **Nov. syn.**
3. *Recurvaria blattariae* var. b Haworth, 1828, *Lep. Brit.*, p. 553. Larva feeding only on *Salix repens*. This small ssp. occurs only on the North Sea coasts of England, Holland and North-west Germany.

***Anacampsis blattariella* (Hübner, 1796)**

1. *Tinea blattariella* Hübner, 1796, *Samml. europ. Schmett.*, *Tin.*, **5**, pl. 22, Fig. 148.
2. *Recurvaria blattariae* Haworth, 1828, *Lep. Brit.*, p. 553. (Part.)
3. *Anacampsis populella* Cl., Duponchel (part) 1838, *Hist. Nat. Lep. Fr.*, **11**, pl. 296, Figs. 1 and 3.

* On Research Grant from the 'Deutsche Forschungsgemeinschaft'.

4. *Anacampsis betulinella* Vari, 1941, *Tijdschr. v. Ent.*, **84**:352, pl. 1, Figs. 1-4. **Nov. syn.**

Genitalia:

1. Vari, 1941, *Tijdschr. v. Ent.*, **84**:352, Fig. 1 (♂); Fig. 3 (♀).
Larva feeding on birch.

The above synonymy was established during a visit to the British Museum (Natural History), London, where I was able to study some rare papers, including the original plate of Hübner. Furthermore, thanks are due to Dipl. Ing. G. A. Graf Bentinck, Amsterdam, and Professor Dr. F. Heydemann, Plön/Germany.

A NOTE ON AN APHID NEW TO EUROPE

By P. H. WARD

Dept. of Entomology, British Museum (Natural History)

During 1960 a considerable number of Aphididae were taken in a mercury vapour light trap at Whetstone, Hertfordshire. All of these were forwarded to Dr. V. F. Eastop at the British Museum (Natural History) for identification. On the third of June a single specimen was taken which was believed to be *Masonaphis (Ericobium) goldamaryae* (Knowlton). The next night produced a further specimen which confirmed the determination. A search in the garden, where the trap is situated produced a considerable number of specimens on *Solidago rigida* (Goldenrod), this was on the 9th June. Dr. Eastop subsequently collected more examples on *S. rigida* at Kew Gardens on the 13th July. More specimens were obtained at the same locality from *Aster novae-angliae* on 21st September, *Erigeron bonariensis* on 24th September, and *Aster simplex* on the 27th September.

The specimens taken in the light trap represent the first record of the occurrence in Europe of this species, which was previously known only from the U.S.A. and Canada.

This species was first described by Knowlton (1938, *J. Kans. ent. Soc.*, **11**:3) from specimens on *Solidago canadensis*, and placed in the genus *Amphorophora* Buckton. These examples came from two localities in Utah, U.S.A. MacGillivray (1960, *Temminckit*, **10**:1) when re-describing the species transferred it to the genus *Masonaphis* H.R.L.

The method of introduction of this species into Britain is unknown. It seems possible, however, that it may have been accidentally imported.

IDENTITY, SYNONYMY AND GENERIC POSITION OF *TINEA CONFUSELLA* H.-S.

(LEP., TINEIDAE)

By GÜNTHER PETERSEN
Deutsches Entomologisches Institut, Berlin

Herrich-Schäffer described this species as '*Tinea confusella* F.R.', which means that the original specimens were forwarded to him by Fischer von Roeslerstamm. Data and location are given as 'Im Juli bei Wien an Felsen'.

The first publication dealing with the genitalia characters of this species appears to be the figures of both sexes in Pierce & Metcalfe (1935, pl. LXII). These authors made their genitalia preparations of two specimens (♂ ♀) labelled '*T. confusella* H.-S. Wallis (Anderegg), named by Frey, in P. C. Zeller's collection.

In my work on the genitalia of the Palaearctic Tineidae (Petersen, 1957, page 362, Fig. 179) I have published a figure of the male genitalia, based upon two ♂♂, Orsova, Banat, vii.1909, Coll. Leonhard, in the Deutsches Entomologisches Institut, Berlin. I have explained there my opinion that the figures given by Pierce & Metcalfe must be very poor ones or represent quite another species.

I am much indebted to Mr. J. D. Bradley of the British Museum (Natural History) for his kind help. The rediscovery of the original specimens of *Tinea confusella* H.-S. from the Herrich-Schäffer Collection and the dissection of the male and female type specimens has enabled me to identify conclusively the exact position and synonymy of *confusella*.

The information obtained following the examination of the genitalia of the original specimens has shown that they belong to the genus *Obesoceras* Pet., being conspecific with *Obesoceras danubiellum* Pet. 1959. Some months after the publication of my description of *danubiellum* the same species was described again by Jäckh under the name of *Obesoceras nigrescens* from North Italy. The authentic specimens and the descriptions of the species involved may be summarized as follows:

***Obesoceras confusellum* (H.-S.), 1850**

Tinea confusella Herrich-Schäffer, 1850, *Syst. Bearb. Schmett. Europa*, 5: 74. Regensburg, 1850, *Suppl. Abb.*, 276.

Synonymy:

Obesoceras danubiellum Petersen, 1959. *Acta Soc. ent. cehoslov.*, 56: 197; **nov. syn.**

Obesoceras nigrescens Jäckh, 1959, *Boll. Soc. ent. ital.*, 89: 86-87; **nov. syn.**

Lectotype, ♂, allotype, ♀, Wien, Brühl, Juli an Felsen, ex H.-S. Coll., in Hofm. Coll.—Wlsm. Coll.; in the British Museum (Natural History), London.

Distribution:

In addition to the types, the following specimens belonging to this species are known:

3 ♂♂, Krems/Donau, Austria, 22.vi.1936; in the Nat. Mus., Prague.

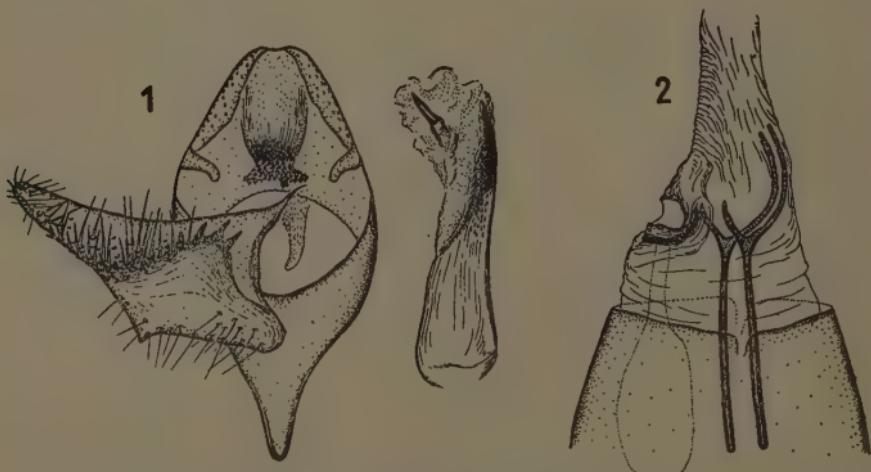
2 ♂♂, Trentino, Valle del Sarca, Pietramurata, N. Italy, 5.vi.1958, Coll. E. Jäckh; in Bremen.

1 ♂ Kehlheim/Rhein, v., Coll. Möbius; in the Staatl. Museum f. Tierkunde, Dresden.

For descriptions of the external characters and male genitalia see Petersen, 1959, *Acta Soc. ent. czechoslov.*, **56**: 197.

Male genitalia: Fig. 1.

Female genitalia: Fig. 2. Very similar to *O. granulatellum* H.-S. as to anterior apophyses and ostium bursae. Ductus bursae very short. No signum visible.



Figs. 1-2: *Obesoceras confusellum* (H.-S.). (1) Male genitalia.
(2) Female genitalia.

Pierce & Metcalfe (1935, pl. lxii) have figured male and female genitalia of a species which they call 'confusella Z'. But Zeller did not describe a species under this name. He only mentioned (*Linn. Ent.* **6**: 149) in an annotation, 'Tin. confusella H.-S., Fig 276', and this annotation is mentioned by Herrich-Schäffer, page 74, again. From this and the labelling of the specimens it is quite clear that Pierce & Metcalfe believed they had the same species before them as that which Herrich-Schäffer had described as *T. confusella*. It is therefore necessary to give the species figured by Pierce & Metcalfe a new name. This has been done unintentionally by Gozmány (1960, *Acta zool. Acad. sci. Hung.*, **6**: 109) when he described *Infurcitinea captans* from Jugoslavia. From the study of his type material it is evident

that he has described the same species which was figured by Pierce & Metcalfe as '*confusella* Z.'

So the synonymy must read:

***Infurcitinea captans* (Gozmány)**

—, 1960, *Acta zool. Acad. sci. Hung.*, 6:109.

Synonymy:

Tinea 'confusella Z.' (sic.), Pierce & Metcalfe, 1935 (*nec* H.-S., 1850); **nov. syn.**

Types:

Holotype: ♂, Wippach, Carniola, 15.vi.1909, Coll. Krone.

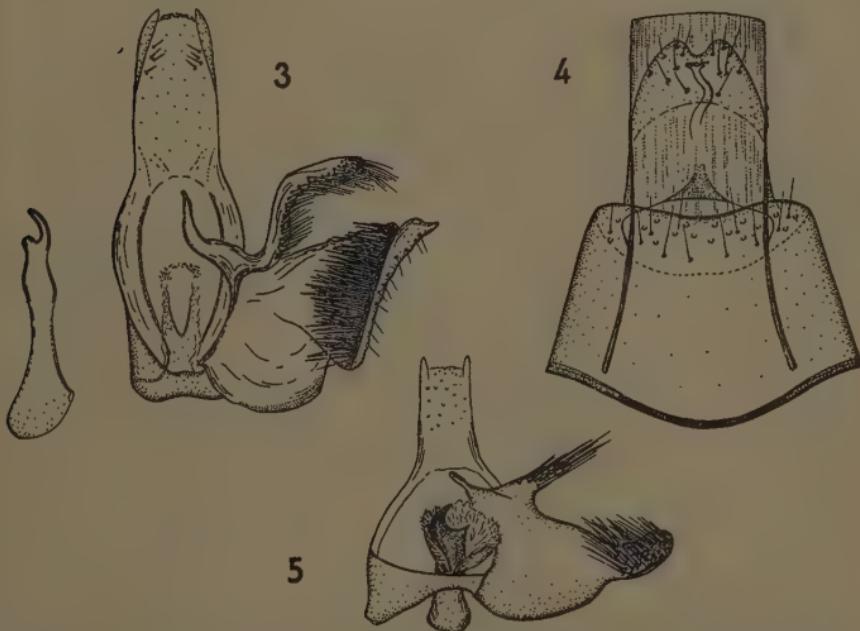
Paratypes: ♂, Zengg, Croatia, 7.vi.1918, Dobiasch; 2 ♂♂, Wippach, Carniola, 19.vi.1907; 1 ♂, Prolog. pl., Bosnia, 1,100 m., 28.vii.1929, leg. Novak; all specimens in the Nat. Hist. Mus., Budapest.

Distribution:

Switzerland, Austria, Croatia and Bosnia.

Male genitalia: Fig. 3.

Female genitalia: Fig. 4.



Figs. 3-5: (3) *Infurcitinea captans* Gozm., male genitalia. (4) Ibid., female genitalia. (5) *Infurcitinea banatica* Pet., male genitalia.

The species which I erroneously described under the name of *confusella* H.-S. is without a name, and I propose for it the name:

Infurcitinea banatica sp. nov.

pro *Infurcitinea confusella* H.-S., Petersen, 1957, *Beitr. Ent.*, 7: 362, Fig. 179 (nec H.-S., 1850; nec P. & Metc., 1935); nov. syn.

Types:

Holotype: ♂, Orsova, Banat, vii.1909, Coll. Leonhard; in the Deutsches Entomologisches Institut, Berlin.

Paratype: ♂, same date.

Male genitalia: Fig. 5.

Female unknown.

A RAPID TECHNIQUE FOR MOUNTING MOSQUITO LARVAE

By WILLIAM F. RAPP, JNR. and DORLEN S. JONES

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Nearly every handbook for mosquito identification gives a method for making whole-mounts of mosquito larvae. Many of these methods result in excellent slides, but unfortunately all are slow and require much manipulation in the changing of dehydrating and clearing agents. We have long felt the need of a rapid method which would result in good permanent mounts. The following method which has been used for the past two years has resulted in excellent specimens.

After the larvae have been collected they are placed in a three-dram patent lip vial and as much water as possible is removed by a pipette. The vial is two-thirds filled with Cellosolve (two-Ethoxyethanol) and a small plug of cotton is inserted to keep the larvae from moving around in the vial. Upon return to the laboratory the larvae are removed from the Cellosolve, placed in a watch-glass containing xylol and then mounted in synthetic resin.

DISCUSSION

Our experience has shown that Cellosolve is satisfactory for storing mosquito larvae for long periods of time. There appears to be no excess amount of clearing on specimens left over a year in Cellosolve. When Cellosolve was first tried we attempted to mount directly into synthetic resin. In many cases excellent slides were obtained, but in others cloudy areas formed around the specimen indicating the presence of water. With the introduction of the xylol step this problem has been eliminated.

This method does not give satisfactory results on specimens which have been killed and preserved in 70 per cent alcohol.

A SUPPLEMENT TO THE MACROLEPIDOPTERA OF CAITHNESS

By J. H. ROSIE

A list of Lepidoptera found in N.E. Caithness appeared in the *Entomologist's Gazette*, Vol. 9, pp. 158-162, 1958. Since then the following species have been added to the list. They include records going back to before the War, which Mr. S. Swanson has very generously made available to me.

I am greatly indebted to Mr. A. L. Goodson of the Zoological Museum at Tring for the identification of certain specimens.

The nomenclature at specific and generic level follows that in the *Revised Indexed Check-List of the British Lepidoptera*, by I. R. P. Heslop (1959, *et seq.*).

Rhopalocera

SATYRIDAE

Coenonympha pamphilus L.

Uncommon in two localities in the S.E. of the county.

Heterocera

NOTODONTIDAE

Closteria pigra Hufn.

Only one locality, but not uncommon there.

THYATIRIDAE

Thyatira batis L.

A few at sugar in one locality.

Tethea duplaris L.

Fairly common.

Achlya flavicornis L.

Not uncommon where birch occurs.

LYMANTRIIDAE

Leucoma salicis L.

One record only, from Mr. Swanson.

DREPANIDAE

Drepana falcataria L.

Not very common and rather local.

ARCTIIDAE

Spilosoma lubricipeda L.

Recorded by Mr. Swanson.

NOCTUIDAE

Euxoa tritici L.

Not uncommon on coastal sandhills.

Agrotis vestigialis Hufn.

As above.

A. exclamationis L.

Fairly common.

Peridroma porphyrea Schiff.

Not very common.

(*saucia* Hüb.)

Diarsia brunnea Schiff.

Two records, one bred from larva.

D. mendica F. (*festiva* Schiff.)

Not uncommon.

Amathes c-nigrum L.

Common.

A. sexstrigata Haw.

Fairly common.

Anaplectoides prasina Schiff.

A few at sugar; one locality.

Eurois occulta L.

One locality, but fairly common there.

Cerastis rubricosa Schiff.

Mr. Swanson reports this as being not uncommon.

Hada nana Hufn.

One or two records by Mr. Swanson.

Hadena thalassina Hufn.

A few taken.

H. bombycina Hufn.

Not uncommon.

H. conspersa Schiff.

Several bred from larvae on Sea Campion.

H. bicruris Hufn. (*capsincola* Hüb.)

Not uncommon where food-plants are found.

H. rivularis F. (*cucubali* Schiff.)

As above.

Orthosia gothica L.

Common.

<i>O. stabilis</i> Schiff.	Common.
<i>Leucania pallens</i> L.	Fairly common.
<i>L. impura</i> Hübn.	Fairly common.
<i>Arenostola pygmina</i> Haw.	Local, but common enough where found.
<i>Caradrina clavigalis</i> Scop.	Not uncommon.
<i>Apamea lithoxylaea</i> Schiff.	One or two taken at sugar.
<i>A. sordens</i> Hufn. (<i>basilinea</i> Schiff.)	Common.
<i>A. remissa</i> Hübn.	Fairly common.
<i>Procas fasciuncula</i> Haw.	Very common.
<i>Procas literosa</i> Haw.	Reported as not uncommon by Mr. Swanson.
<i>Hydraecia oculata</i> L.	Common at ragwort on coastal sand-hills.
<i>Amphipyra tragopoginis</i> Clerck	Fairly common.
<i>Apatele menyanthidis</i> View.	Two bred from larvae.
<i>Xylena vetusta</i> Hübn.	Taken fairly regularly.
<i>Bombycia viminalis</i> F.	One or two bred from larvae.
<i>Agrochola lota</i> Clerck	Mr. Swanson finds the larvae not uncommon on sallow.
<i>A. circellaris</i> Hufn.	Taken occasionally by Mr. Swanson.
<i>Anchoscelis helvola</i> L.	Two bred from larvae on heather.
<i>Cirrhia icteritia</i> Hufn.	One at light in 1960 (S. Swanson).
PLUSIIDAE	
<i>Plusia bractea</i> Schiff.	Two records.
<i>Plusia festucae</i> L.	By no means common but seen occasionally.
HYDRIOMENIDAE	
<i>Europhila badiata</i> Schiff.	One or two bred from larvae.
<i>Electrophaes corylata</i> Thunb.	Not uncommon where birch occurs.
<i>Lygris pyraliata</i> Schiff.	One locality but fairly common there.
<i>Thera obeliscata</i> Hübn.	One locality, only two taken.
<i>Hydriomena ruberata</i> Freyer	Fairly common.
<i>Chesias legatella</i> Schiff.	Common where food-plant occurs.
<i>Carsia scoriata</i> Hübn.	Rather local and not very common.
	(<i>paludata</i> Thunb.)
<i>Trichopteryx carpinata</i> Borkh.	Not uncommon.
<i>Oporinia autumnata</i> Borkh.	Common.
<i>Venusia cambrica</i> Curt.	One specimen bred from larva found on birch.
<i>Eupithecia satyrata</i> Hübn.	Fairly common.
	race <i>callunae</i>
<i>E. vulgata</i> Haw.	Common.
<i>E. lariciata</i> Freyer	Not uncommon where larch occurs.
<i>Chloroclystis rectangulata</i> L.	Taken occasionally.
SELIDOSEMIDAE	
<i>Campaea margaritata</i> L.	Common.
<i>Erannis marginaria</i> F.	One bred from larva (S. Swanson).
<i>Cleora rhomboidaria</i> Schiff.	Taken at light occasionally; probably more common than my records suggest.
<i>Alcis repandata</i> L.	Fairly common in one locality.

THE CAMBRIDGE COLLECTION OF AGROMYZIDAE (DIPTERA)

By G. C. D. GRIFFITHS, F.R.E.S.
Christ's College, Cambridge

In the Museum of the Entomological Department of Cambridge University there is a small collection of Agromyzidae, containing nearly 400 specimens, mostly collected between 1900 and 1910. Many of the British collections of this family have been revised recently by Mr. K. A. Spencer, and the results published. The Cambridge collection, however, has not previously been studied by a specialist. When I examined it recently I found some interesting species represented, including a few additions to the British List. I have decided to take the opportunity of publishing this summary of the collection, including the commoner species, for future reference. Brief notes as to date and locality are given: we have clearly got beyond the stage of merely establishing whether a species is British or not in this group, and some attempt ought to be made soon to assess the approximate distribution of many of the British species.

AGROMYZINAE

Agromyza Fallén

A. albipennis Meigen: Two specimens—Wells (Somerset), vii; Cambridge, vii.
A. mobilis Meigen: Five specimens—New Forest, vi, ix.
A. reptans Fallén: Five specimens—New Forest, Wells (Somerset), Cambridgeshire, vi-viii.

Melanagromyza Hendel

M. angelicae Frost or *M. lappae* Loew: Three specimens—Cambridge, vii-viii. Spencer (1957) does not consider these species distinguishable in the adult stage.
M. cirsii Rondani: Fourteen specimens—Padstow, New Forest, St. Merryn, Cambridge, vi-vii.
M. goniaea Hendel: New Forest, vi. 1903.
M. rostrata Hendel: Padstow, vii. 1901.
M. sativae Spencer: Two specimens—Cambridge, v.

Ophiomyia Braschnikov

O. achilleae Hering: Farringford, Isle of Wight, vi. 1921.
O. maura Meigen: New Forest, vi.
O. penicillata Hendel: New Forest, vii. 1904.

Tylomyza Hendel

T. pinguis Fallén: New Forest; vii.

PHYTOMYZINAE

Phytobia Lioy

P. (Phytobia) barnesi Hendel: Three specimens—Batford, Herts., 1932.

P. (Icteromyza Hendel) capitata Zetterstedt: Thirteen specimens—eleven from the New Forest, vi-vii, also Crowborough (Sussex) and Nethy Bridge, vi.

P. (Dizygomyza Hendel) crassiseta Strobl: Farringford, Isle of Wight, vi.1921.

P. (D.) luctuosa Meigen: Twenty-nine specimens—mainly from the New Forest, also Logie, Nethy Bridge, Crowborough, St. Merryn, vi-ix.

P. (D.) morosa Meigen: Five specimens—Cambridge, vii; New Forest, vii; Spey Bridge, vii; Nethy Bridge, vi.

Cerodonta Rondani

C. affinis Fallén: New Forest, viii.1908.

C. denticornis Panzer: Thirty-four specimens—Cambridgeshire, Norfolk, Essex, Dartford, Padstow, St. Merryn, New Forest, Logie, Beattock, Nethy Bridge, v-x.

C. fulvipes Meigen: Thirty-two specimens—Cambridge, Carrow (Norfolk), Crowborough (Sussex), St. Merryn, Padstow, New Forest, Brockenhurst, Beattock, Nethy Bridge, v-viii.

Liriomyza Mik

L. fasciola Meigen: Padstow, vii.

L. flaveola Fallén: Ten specimens—Whittlesford (Cambs.), Padstow, New Forest, Auchencairn, Beattock, vi-vii.

L. pedestris Hendel: Nethy Bridge, vi.1908.

Pseudonapomyza Hendel

P. atra Meigen: St. Merryn, vi.

Napomyza Haliday in Westwood

N. elegans Meigen: Two specimens—New Forest, vi; Strathspey district, vii.

N. lateralis Fallén: Thirteen specimens—Cambridge, vi-x; New Forest, vi; Crowborough, viii; Wells (Somerset), ix; Carrow (Norfolk), ix.

N. xylostei Kaltenbach: Eight specimens bred from Granchester (Cambs.).

Napomyza sp.: Cambridge, 5.vi.1902 (see below).

Phytomyza Fallén

P. affinis Fallén: Two specimens—New Forest, vi; Auchencairn, vi.

P. albipennis Fallén five specimens—Wye Downs (Kent), Norwich, Padstow, Shelford, v-x.

P. angelicae Kaltenbach: Three specimens without data.

P. atricornis Meigen: Fifty-three specimens, mostly bred from garden *Chrysanthemum* in Bradford. Also Padstow and Cambridge.

P. crassiseta Zetterstedt: Crowborough (Sussex), x.

P. flavidornis Fallén: Wells (Somerset), iv.

P. nigripennis Fallén: Three specimens—Nethy Bridge, Tatsfield, vi.

P. notata Meigen: Padstow, vii.1906.

P. ranunculi Schrank: 114 specimens—Cambridge, Crowborough (Sussex), New Forest, Padstow, Grinshill (Salop), St. Merryn,

Mildenhall, Shelford, Heacham (Norfolk), Aldeburgh (Suffolk), 30.iii-4.x.

P. robustella Hendel: Fifteen specimens—eight from the New Forest, vi; also Cambridge, vi; Wells, vi; Padstow, ix.

P. rufipes Meigen: Three specimens—Cambridge, Padstow, ix.

P. varipes Macquart: Isle of Lewis, vii.

P. vitalbae Kaltenbach: Nine specimens—Cambridge, vi.; Auchenbowle, 5.x.

NOTES ON THE MORE INTERESTING SPECIES

Melanagromyza goniaea Hendel (New Forest, vi.1903)

Spencer (1957) summarized the previous records of this species. He refers to four specimens in Collin's collection taken at Porthcawl, Glamorgan, vi-vii.1906, and Snailwell, Cambridgeshire, vi.1908. Also known from Germany, Austria and Finland. Spencer states (*in litt.*) that he is not convinced of the distinction between this species and *M. nostradamus* Hering, and regards them as a doubtful group. The life history is unknown.

M. rostrata Hendel (Padstow, vii.1901 (Lamb))

New to the British List. Hendel (1931-6) knew of only one specimen from the Liegnitz region in Germany. The life history is unknown.

Ophiomyia achilleae Hering (Farringford, Isle of Wight, vi.1921)

Spencer (1957) records three specimens from Surrey. He states (*in litt.*) that there are also some specimens in Collin's collection. Recorded from Germany and Sweden as a stem miner of *Achillea millefolium*. The species will probably prove to be not uncommon.

O. penicillata Hendel (New Forest, vii.1904 (Sharp))

The only other known British specimen is that recorded by Spencer (1957) from Collin's collection taken at Lyndhurst, Hants., 8.v.1897. Also known from Austria and Dalmatia. The life history is unknown.

Phytobia (Phytobia) barnesi Hendel (Batford, Herts, 1932).

Three specimens bred by the discoverer of the species, H. F. Barnes. Unfortunately the bristles have been nearly all rubbed off. Barnes (1933) gives a detailed account of the biology of this species.

P. (Dizygomyza) crassiseta Strobl (Farringford, Isle of Wight, vi.1921)

The only other British record is that of Parmenter (1952) from Stone Marshes, Kent, 22.v.47. Known from Austria, Spain and Russia. The life history is unknown.

Cerodonta affinis Fallén (New Forest, viii.1908 (Lamb))

New to the British List. The species is widely found in Central Europe and Sweden.

Napomyza sp. (undescribed): Cambridge, 5.vi.1902, one ♀.

This specimen differs from *N. lateralis* Fallén by the prominent frons, clearly projecting in profile (compare *N. annulipes* Hendel), with four rows of orbital setulae. The squamal fringe is brown.

From *N. annulipes* Hd. it differs in having completely black

antennae, and a darker squamal fringe. The yellow coloration on the abdomen is far less extensive.

The species is thus intermediate between *N. annulipes* Hd. and *N. lateralis* Fall. in its external characters.

Phytomyza notata Meigen (Padstow, vi.1906 (Lamb))

This species can now be included in the British List with certainty. There is also a specimen in the author's collection bred from blotch mines on a *Ranunculus* sp. collected at Mickleham (Surrey) 18.x.53. The fly emerged in the following spring. It was bred along with large numbers of the common *P. fallaciosa* Brischke, and the mines were not distinguished. Hering (1949) records the species from France and distinguishes it from *P. ranunculi* Schrank

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G. C. D. GRIFFITHS.

Christ's College, Cambridge.
18th January, 1961.

RECORDS OF LEPIDOPTERA FROM CORNWALL, 1943-58

By W. G. TREMEWAN

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The following records are taken from the diaries which I kept during the period 1943-58 while living in Cornwall. They refer to species recorded within a five-mile radius of Redruth, unless otherwise stated.

The nomenclature of the Macrolepidoptera and Tortricoidea is based on the *Revised Indexed Check-List of the British Lepidoptera*, 1960, by I. R. P. Heslop. The nomenclature of the Tineoidea follows that of the *Indexed Check-List of the British Lepidoptera*, 1947, by I. R. P. Heslop.

RHOPALOCERA

PIERIDAE

Pieris brassicae L.

P. rapae L.

P. napi L.

Anthocharis cardamines L. Common.

Colias hyale L. One male seen 17.ix.1955.

C. croceus Fourc. Varies according to immigration. Usually a good percentage of the cream and white forms of the female.

Gonepteryx rhamni L. Occasional examples of both sexes have been observed in the spring after hibernation, but never in the autumn. The species does not breed in the area and its food-plant is absent.

DANAIDAE

Danaus plexippus L. One specimen seen in good condition 25.vii.1943.

NYMPHALIDAE

Argynnis paphia L. Fairly common in wooded and partially wooded localities.

A. aglaja L. Widely distributed and often common.

A. euphrosyne L. Common in one partially wooded valley.

A. selene Schiff. Widely distributed, found on heathland and not in woods; abundant on the sand-hills at Gwithian, where a second brood usually occurs every year. The specimens of the second brood are smaller than those of the spring generation.

Euphydryas aurinia Rott. Occurs in two localities where it is abundant. Single specimens have also been taken at Gwithian, but I was unable to find the colony. The species also occurs at Kennack Sands on the Lizard peninsula.

Polygonia c-album L. Widely distributed and often common.

Aglais urticae L.

Nymphalis io L.

Vanessa cardui L. Usually recorded every year and often common.

Vanessa atalanta L.

SATYRIDAE

Melanargia galathea L. Widely distributed along the coast north of Bude. It is interesting to note that here the species does not occur in colonies but is widespread over the countryside.

Pararge aegeria L. Common. The form *aegerides* Staud. is the usual form; a specimen with fulvous markings was seen but not captured.

Pararge megera L.

Eumenis semele L.

Maniola jurtina L.

Maniola tithonus L.

Aphantopus hyperantus L.

Coenonympha pamphilus L.

LYCAENIDAE

Lycaena phlaeas L.

Thecla quercus L. Fairly common in one locality.

Callophrys rubi L. Common and widely distributed.

Plebeius argus L. Abundant on heathland; also very common at Gwithian, where the blue form of the female occurs frequently.

Aricia agestis Schiff. Locally abundant.

Celastrina argiolus L. Common some years but absent in others.

Polyommatus icarus Rott.

Maculinea arion L. To be found in North Cornwall, but in my experience never common.

HESPERIIDAE

Pyrgus malvae L. Rare, only single specimens having been taken in one locality.

Erynnis tages L.

Thymelicus sylvestris Poda.

Ochlodes venata Br. & Grey.

HETEROCERA
SPHINGIDAE

Mimas tiliae L. Widely distributed.

Laothoe populi L. Widely distributed.

Smerinthus ocellata L. Widely distributed.

Herse convolvuli L. One specimen taken 5.ix.1952.

Sphinx ligustri L. Widely distributed.

Deilephila porcellus L. One specimen from Gwithian 14.vi.1957.

D. elpenor L. Common.

Macroglossum stellatarum L. Usually common.

NOTODONTIDAE

Harpyia bifida Brahm. Two specimens.

Cerura vinula L. Widely distributed.

Stauropus fagi L. Widely distributed; none of the specimens are affected by industrial melanism.

Pheosia tremula Clerck. Two specimens.

Notodonta ziczac L.

N. dromedarius L. One specimen 3.viii.1954.

Lophopteryx capucina L. One specimen 16.viii.1952.

Pterostoma palpina Clerck. Four specimens.

Phalera bucephala L.

THYATIRIDAE

Orgyia antique L. Widely distributed and often common.

Thyatira batis L. Fairly common.

LYMANTRIIDAE

Orgyia antiqua L. Widely distributed and often common.

Dasychira pudibunda L.

Euproctis similis Fuessl.

Lymantria monacha L. Fairly common.

LASIOCAMPIDAE

Malacosoma neustria L.

Poecilocampa populi L.

Lasiocampa quercus L. Very common. The Cornish specimens are referable to *calluna* Palm., but the larvae only hibernate for one winter and the moths appear in July and August.

Lasiocampa trifolii Schiff. Specimens were bred from larvae which were abundant on the cliffs at the Lizard and Kynance Cove. The larvae were feeding on *Lotus corniculatus*.

Philudoria potatoria L.

SATURNIIDAE

Saturnia pavonia L.

DREPANIDAE

Drepana cultraria F. One specimen.

Cilix glaucata Scop.

NOLIDAE

Nola confusalis H.-S. Common.

HYLOPHILIDAE

Pseudoips bicolorana Fuessl. The remains of one specimen found in a spider's web.

ARCTIIDAE

Spilosoma lubricipeda L.

S. lutea Hufn.

Cycnia mendica Clerck. Fairly Common.

Phragmatobia fuliginosa L.

Arctia caja L.

A. villica L.

Panaxia dominula L. A flourishing colony at Boscastle.

Callimorpha jacobaeae L. Common wherever *Senecio* grows.

Atolmis rubricollis L. Common in two localities.

Miltochrista miniata Forst.

Lithosia quadra L. One female taken 31.vii.1948.

Eilema lurideola Zinck.

E. complana L. Two specimens at sugar 16.vii.1955 at Gwithian.

NOCTUIDAE

Apatele megacephala Schiff. Two bred from larvae 1953.

A. psi L.

A. rumicis L.

Cryphia perla Schiff. Common.

C. muralis Forst. Very common.

Agrotis segetum Schiff.

A. puta Hübn.

A. exclamationis L.

A. epsilon Hufn.

Euxoa nigricans L.

E. tritici L. Fairly common.

Lycophotia varia Vill.

Peridroma porphyrea Schiff. Three specimens.

Amathes agathina Dup. Fairly common.

A. glareosa Esp. Fairly common.

A. castanea Esp. Two specimens 3.ix.1954.

A. c-nigrum L.

A. triangulum Hufn. Two specimens 5.vii and 14.vii.1955.

A. sexstrigata Haw. Fairly common.

A. xanthographa Schiff.

Diarsia brunnea Schiff. Fairly common.

D. mendica F.

D. rubi View.

Ochropleura plecta L.

Axylia putris L.

Noctua pronuba L.

Euschesis comes Hübn.

E. janthina Esp.

E. interjecta Hübn. One specimen from Redruth. The moth is abundant, however, on the sandhills at Gwithian.

Lampra fimbriata Schreb. Two specimens 5.viii.1953.

Anaplectoides prasina Schiff. One specimen 13.vi.1955.

Polia nebulosa Hufn. Two specimens of the white form.

Mamestra brassicae L.

Melanchra persicariae L.

Ceramica pisi L.

Diataraxia oleracea L.

Scotogramma trifolii Rott.

Hadena w-latinum Hufn. One specimen 14.vi.1952.

H. conspersa Schiff. Two specimens.

H. bicurvis Hufn.

H. rivularis F.

H. bicolorata Hufn. Fairly common.

Tholera popularis F.

T. cespitis Schiff. Fairly common.

Eumichtis lichenea Hübn. Common.

Luperina testacea Schiff.

Procus strigilis Clerck.
P. versicolor Borkh. Common.
P. fasciuncula Haw.
P. literosa Haw.
P. furuncula Schiff.
Apamea remissa Hübn.
A. secalis L.
A. crenata Hufn. Fairly common.
A. lithoxylaea Schiff. Fairly common.
A. monoglypha Hufn.
Aporophyla lunula Stroem. Common.
Dasypolia templi Thunb. Uncommon.
Antitype flavigincta Schiff. Common.
Allophyes oxyacanthalae L. Fairly common.
Euplexia lucipara L.
Phlogophora meticulosa L.
Naenia typica L. One specimen 1.vii.1950.
Hydraecia oculata L. One specimen 8.ix.1953
H. micacea Esp.
Gortyna flavago Schiff.
Coenobia rufa Haw. Locally common.
Rhizedra lutosa Hübn. One specimen 10.x.1953.
Leucania pallens L. Rare, five specimens only!
L. impura Hübn.
L. comma L.
L. lithargyria Esp.
L. conigera Schiff.
Stilbia anomala Haw. Two specimens.
Meristis trigrammica Hufn. Not uncommon.
Caradrina alsines Brahm. Common.
C. blanda Schiff. Fairly common.
C. clavipalpis Scop.
Laphyagma exigua Hübn. Four specimens 30.vii.1949, 8.viii.1949,
 18.iv.1945, 4.vii.1952.
Rusina tenebrosa Hübn.
Amphipyra pyramidea L.
A. tragopoginis Clerck.
Cerastis rubricosa Schiff.
Panolis flammea Schiff. One specimen 28.iii.1948.
Orthosia gothica L.
O. miniosa Schiff. One specimen 1.iv.1961.
O. cruda Schiff. Fairly common.
O. stabilis Schiff.
O. munda Schiff. Fairly common.
O. gracilis Schiff. One specimen 10.iv.1948.
Cosmia trapezina L.
Omphaloscelis lunosa Haw.
Agrochola iota Clerck.

A. macilenta Hübn. Fairly common.

A. circellaris Hufn. Fairly common.

A. lychnidis Schiff.

Citria lutea Stroem. One specimen 16.ix.1956.

Conistra vaccinii L.

C. ligula Esp.

Dasycampa rubiginea Schiff. Two specimens at ivy bloom 8.xi. and 10.xi.1949.

Lithophane socia Hufn.

L. ornitopus Hufn. One specimen 4.iii.1953.

Xylocampa areola Esp.

Xylena exsoleta L. One specimen 12.x.1953.

X. vetusta Hübn. One specimen 10.iii.1952.

Cucullia verbasci L. Two specimens.

C. umbratica L. Three specimens from Redruth, one from The Lizard.

Anarta myrtilli L.

Panemeria tenebrata Scop.

PLUSIIDAE

Eublemma parva Hübn. Two specimens 18.v.1945 and 25.v.1950.

Lithacodia fasciana L. Fairly common.

Rivula sericealis Scop.

Phytometra viridaria Clerck.

Scoliopteryx libatrix L.

Plusia chrysitis L.

P. iota L.

P. pulchrina Haw. Fairly common.

P. gamma L.

Unca triplasia L.

U. tripartita Hufn.

Euclidimera mi Clerck.

Zanclognatha tarsipennalis Treits.

Z. nemoralis F.

Hypena proboscidalis L.

MONOCTENIIDAE

Alsophila aescularia Schiff.

GEOMETRIDAE

Pseudoterpna pruniata Hufn.

Hemistola immaculata Thunb. One specimen 12.vi.1955.

Jodis lactearia L. One specimen 14.vi.1952.

Hemithea aestivaria Hübn.

Sterrhia subsericeata Haw.

S. aversata L.

S. biselata Hufn.

S. dimidiata Hufn.

Scopula immutata L.

S. promutata Guen.

S. imitaria Hübn.

Calothysanis amata L. Uncommon.

Cosymbia linearia Hübn. One specimen only.

Anaitis plagiata L. Widely distributed.

Trichopteryx carpinata Borkh. Rare.

Acasis viretata Hübn.

Ecliptopera silacea Schiff.

Lygris prunata L. Two specimens.

L. testata L.

L. pyraliata Schiff. Uncommon.

Dysstroma truncata Hufn.

D. citrata L. One specimen 20.vii.1949.

Chloroclysta siterata Hufn. Three specimens xi.1949.

Thera variata Schiff. One specimen 16.x.1953.

T. firmata Hübn. Two specimens 16.x.1953 and 6.x.1954.

Lampropteryx otregiata Metc. One specimen 14.ix.1956.

L. suffumata Schiff.

Xanthorhoe ferrugata Clerck.

X. spadicearia Schiff.

X. montanata Schiff.

X. fluctuata L.

Colostygia pectinataria Knob.

C. multistrigaria Haw. Fairly common.

Rhodometra sacraria L. One specimen 1949, one in 1950, and one female 1955 from which two specimens were bred, the rest of the brood dying as pupae.

Ortholitha plumbaria F. Common; also five specimens from Morwenstow and one from The Lizard.

Ortholitha mucronata Scop. Four specimens. Three of these specimens are ab. *umbrifera* Prout. This species is probably as common as *plumbaria*, but the scarcity of records is probably due to random collecting.

Ortholitha chenopodiata L.

Oporinia dilutata Schiff.

Asthena albulata Hufn. Fairly common.

Hydrelia flammeolaria Hufn. One specimen 3.viii.1954.

Operophtera brumata L.

Epirrhoe galiata Schiff.

E. rivata Hübn. Uncommon.

E. alternata Müll.

Euphyia unangulata Haw. One specimen 23.vii.1949.

E. bilineata L.

Lyncometra ocellata L.

Perizoma affinitata Steph. One specimen 31.vii.1948.

P. alchemillata L.

P. flavofasciata Thunb. Two specimens.

P. albulata Schiff. Common near Gwithian.

Hydriomena furcata Thunb.

Europhe badiata Schiff. One specimen 20.iv.1948.

Nycterosea obstipata F. Eighteen specimens bred from a female taken in 1949. Two males captured in 1954 and a male and a female in 1955.

Eupithecia centaureata Schiff. Not uncommon.

E. pulchellata Steph.

E. venosata F. One specimen 25.v.1952.

E. distinctaria H.-S. One specimen 28.vi.1953.

E. assimilata Doubl. Uncommon.

E. absinthiata Clerck.

E. vulgata Haw.

E. castigata Hübn.

E. satyrata Hübn. One specimen 11.v.1952.

E. icterata Vill. One specimen 28.vii.1951.

E. nanata Hübn.

E. abbreviata Steph. Uncommon.

E. dodoneata Guen. One specimen 11.v.1956.

E. subnotata Hübn. One specimen 4.vii.1953.

Gymnoscelis pumilata Hübn.

Chloroclystis coronata Hübn.

C. rectangulata L. Uncommon.

Abraxas grossulariata L.

Lomasplilis marginata L. Fairly common.

Aspitates ochrearia Rossi. Common at Gwithian.

Gnophos obscurata Schiff.

Bapta bimaculata F. Uncommon.

B. temerata Schiff.

Deilinia pusaria L. Fairly common.

D. exanthemata Scop.

Elloptia fasciaria L. One specimen 3.viii.1954.

Semiothisa notata L. Not uncommon.

Erannis marginaria F.

E. defoliaria Clerck. Uncommon.

Plagodis dolabraria L. Four specimens.

Ennomos quercinaria Hufn. One specimen 16.viii.1952.

Selenia bilunaria Esp.

Apeira syringaria L. One specimen bred 30.vi.1951.

Gonodontis bidentata Clerck. Fairly common.

Crocallis elinguaria L. Common. One gynandromorph taken at light 30.vii.1954.

Colotois pennaria L. Fairly common.

Opisthograptis luteolata L.

Epione repandaria Hufn. One specimen 5.ix.1956.

Pseudopanthera macularia L.

Lithina chlorosata Scop.

Ourapteryx sambucaria L. Fairly common.

Biston betularia L. The whole population is of the normal form.

B. strataria Hufn. Fairly common.

Cleora lichenaria Hufn. Not uncommon.

C. rhomboidaria Schiff.

Alcis repandata L.

Ectropis biundularia Borkh.

Ematurga atomaria L.

PYRALIDAE

Eudorea angustea Steph. Five specimens.

Dipleurina centurionalis Hübn.

Witlesia pallida Schiff. Two specimens 10.viii.1952.

W. cembrae Haw. One specimen 14.vii.1952

W. dubitalis Hübn.

W. ambigualis Treits.

Nymphula nymphaea L. Common around a pond at Newlyn Downs.

Eurrhypara hortulata L.

Nomophila noctuella Schiff.

Pyrausta cingulata L. Widely distributed.

P. purpuralis L. Widely distributed but never common.

P. cespitalis Schiff. Widely distributed.

Udea ferrugalis Hübn. Common.

P. cespitalis Schiff. Widely distributed.

U. olivalis Schiff.

Haritala ruralis Scop.

Opsibotys fuscalis Schiff.

Mecyna asinalis Hübn. One specimen 29.vii.1953.

Ebulea crocealis Hübn. Two from Redruth and one from Gwithian

Evergestis forficalis L.

Endotricha flammealis Schiff. Local, but common where it occurs.

Herculia glaucinalis L.

Hypsopygia costalis F.

Pyralis farinalis L.

Aglossa pinguinalis L. Fairly common.

Laodamia fusca Haw.

Nephopteryx palumbella F. Common, also one specimen from Morwenstow.

Ephestia elutella Hübn. Three specimens.

Anagasta kühniella Zell. One specimen 4.ix.1953.

Homoeosoma sinuella F. One specimen 14.vi.1952.

H. binaevella Hübn. Fairly common.

H. nimbella Dup. Two specimens 14.v.1952.

Cateremna terebrella Germ. & Zinck. Two specimens 3.viii.1954.

Eurhodope advenella Zinck. Fairly common.

Achroia grisella F. Common in one locality.

Aphomia sociella L. Fairly common.

Crambus pascuellus L. Locally common.

C. pratellus L.

C. perlellus Scop.

Catoptria pinella L.

Agriphila culmella L.

A. hortuellus Hübn.

A. latistria Haw. Four specimens at light 3.ix.1954.
A. inquinatella Schiff.
A. geniculea Haw. Fairly common, also at Gwithian.
A. tristella F.
Platytes cerussellus Schiff. Common 11.vi.1955 on the detached rocks at the base of the cliffs at Falmouth.

PTEROPHORIDAE

Stenoptilia pterodactyla L. Local.
S. bipunctidactylus Scop. Two specimens.
S. zophodactyla Dup. One specimen 29.v.1947.
Amblyptilia acanthodactylus Hübn. Widely distributed and often common.
Platyptilia gonodactyla Schiff. Two specimens bred from larvae in seedheads of *Tussilago* from Gwithian.
P. ochrodactyla Schiff.
P. pallidactyla Haw. One specimen 21.vi.1949.
Alucita pentadactyla L.
Adaina microdactylus Hübn. Local.
Aethes cnicana West. Two specimens 2.viii.1951 and 11.viii.1952.
Pterophorus monodactylus L.

ORNEODIDAE

Orneodes hexadactyla L.

ZYGAENIDAE

Zygaena filipendulae L. ssp. *anglicola* Trmn.
Z. trifolii Esp. ssp. *decreta* Vrty. (*palustris* auct.). Common and widely distributed wherever there is suitable marshy ground.

SYNTOMIDAE

Euchromia lethe F. A perfect specimen was found in a box of oranges in a fruit warehouse at Truro 24.vii.1953.

PHALONIIDAE

Hysterosia maculosana Haw.
Eupoecilia angustana Hübn.
Aethes cnicana West. Two specimens 2.viii.1951 and 11.viii.1952.
A. tesserana Schiff. Common on the coast.
Agapeta hamana L.
A. zoegana L.
Cochylichroa atricapitana Steph. Three specimens.
Cochylidia rupicola Curt. One specimen 27.viii.1952.
Cochylis dubitana Hübn. Three specimens.
Stenodes straminea Haw.

TORTRICIDAE

TORTRICINAE

Pandemis heparana Schiff. Not uncommon.
Argyrotaenia pulchellana Haw.
Archips oporana L.

Cacoecimorpha pronubana Hübn. Abundant at Falmouth.

Syndemis muscularana Hübn.

Austrotortrix postvittana Walk. Now widespread and common in many localities. I have found it either as larvae or imagines at Newquay 1950, Falmouth 1953, Camborne and three localities in the Redruth area from 1953 onwards. I have found the larvae feeding on *Euonymus japonicus* only. It is double brooded.

Clepsis consimilana Hübn.

Ptycholoma lecheana L. One specimen 11.vi.1957.

Lozotaenia forsterana F. Not uncommon.

Capua vulgana Fröl. One specimen 23.v.1950.

Batodes angustiorana Haw. One specimen 12.vi.1957.

Pseudargyrotoza conwagana F. Common.

Eulia ministrana L. One specimen at The Lizard 29.v.1949.

Cnephasia conspersana Dougl.

C. longana Haw. One specimen from a larva found at The Lizard 7.vii.1955.

C. chrysanthaneana Dup. Two specimens 5.vii.1952 and 1.viii.1953.

C. interjectana Treits.

Cnephasiella incertana Treits.

Aleimma loeflingiana L.

Tortrix viridana L. Not uncommon.

Argyrotoza bergmanniana L. Common in one locality.

Acleris schalleriana L.

A. aspersana Hübn. Fairly common.

A. variegana Schiff.

A. hyemana Haw. Not uncommon.

A. sparsana Schiff.

A. hastiana L. Uncommon.

A. cristana Schiff. Local, but usually common where it occurs.

A. holmiana L. Four specimens.

A. rhombana Schiff.

A. emargana F.

A. literana L. Not uncommon in one locality.

OLETHRÆTINAE

Dichrorampha petiverella L. Abundant at Falmouth.

D. sequana Hübn. One specimen 23.v.1948.

D. acuminatana Zell. Two specimens. Also one from Falmouth.

D. plumbana Scop. Three specimens.

Laspeyresia succedana Schiff.

L. pomonella L. Uncommon.

Grapholita janthinana Dup. One specimen 5.viii.1952.

Pammene argyrana Hübn. One specimen 17.v.1951.

P. regiana Zell. Two specimens vi.1952.

P. rhediella Clerck.

Spilonota ocellana F. One specimen 1.viii.1953.

Thiodia citrana Hübn. Fairly common at light.

Eucosma hohenwarthiana Schiff. One specimen f. *scopoliana* Haw.

E. cana Haw.
Epiblema scutulana Schiff.
Pardia cynosbatella L.
Notocelia uddmanniana L.
N. suffusana Haw.
N. aquana Hübn. Fairly common.
Gypsonoma sociana Haw. Two specimens.
Zeiraphera insertana F. One specimen 3.viii.1952.
Griselda stagnana Schiff. One specimen 5.vii.1951.
Rhopobota naevana Hübn.
Epinotia caprana F. Three specimens.
E. trimaculana Don.
E. nisella Clerck.
E. tenerana Schiff.
E. paykulliana F. One specimen from Redruth and one from Truro.
E. signatana Dougl. Four specimens.
E. augustana Hübn.
Eudemis profundana Schiff. One specimen 3.viii.1952.
Bactra lanceolana Hübn.
Lobesia reliquana Hübn. Two specimens v.1955.
L. littoralis West. Common.
Endothenia antiquana Hübn. Not uncommon.
Apotomis pruniana Hübn.
Orthotaenia undulana Schiff.
Hedya nubiferana Haw.
Olethreutes lacunana Schiff.
O. striana Schiff. Fairly common.

GELECHIIDAE

Paltodora cytisella Curt. One specimen 24.vii.1950.
Aristotelia tenebrella Hübn. Fairly common.
A. ericinella Dup.
Telphusa humeralis Zell. One specimen 21.vi.1953.
Gelechia basaltinella Zell.
G. domestica Haw. Fairly common.
G. senectella Zell. One specimen 18.vii.1952.
G. diffinis Haw. Three specimens.
G. mulinella Zell.
G. ericetella Hübn.
G. terrella Hübn.
Phthorimaea costella West. Fairly common.
P. maculea Haw. One specimen 29.vii.1953.
Stomopteryx anthyllidella Hübn.
S. vorticella Scop. Two specimens 10.vii.1953.
Acompsia cinerella Clerck. One specimen 5.viii.1953.
Anarsia spartiella Schrank. One specimen 13.vii.1953.
Chelaria conscriptella Hübn.
Oegoconia quadripuncta Haw. Two specimens.
Brachmia gerronella Zell. Fairly common.

COSMOPTERYGIDAE

Chrysoclysta hellerella Dup. Two specimens.
C. aurifrontella Hüb. One specimen 20.v.1948.
Mompha decorella Steph. Two specimens.

OECOPHORIDAE

Dasycera sulphurella F.
 • *Chirocompa lambdella* Don. Fairly common.
Endrosis sarcitrella L.
Borkhausenia pseudospretella Staint. A specimen was taken *in copula* with *E. sarcitrella* on 15.vii.1949. The moths did not separate on killing.
Chimabache fagella F. Very common. All have the ground colour white or cream and are much lighter than the lightest specimens taken in Epping Forest.
Carcina quercana F.
Depressaria apiella Hüb. Five specimens bred from larvae vii.1949.
D. heracliana Degeer.
D. badiella Hüb. One specimen 21.viii.1952.
D. costosa Haw.
D. umbellana Steph.
D. liturella Schiff. Six specimens bred from larvae vii.1955.
D. pallorella Zell. One specimen 31.viii.1955.
D. subpropinquella Staint.
D. arenella Schiff.
D. rotundella Dougl. Three specimens.
D. plana F.
D. alstroemeriana Clerck. Fairly common.
D. yeatiana F. One specimen 18.ix.1956.
D. hypericella Hüb. One specimen bred 1.vii.1948.

HELIOZELIDAE

Heliozela sericiella Haw.

HELIODINIDAE

Pancalia latreillella Curt. A series of specimens was taken on 25.v.1956. The species was restricted to a small meadow but was very abundant.

Schreckensteinia festaliella Hüb.

GLYPHIPTERYGIDAE

Choreutis myllerana F. Locally common.
Anthophila fabriciana L.
Glyphipteryx thrasonella Scop.
G. fischeriella Zell.
G. schoenicolella Staint. One specimen 3.viii.1951.
G. equitella Scop. Common in one locality.
G. haworthana Steph. One specimen 26.v.1951.

ELACHISTIDAE

Perittia obscuripunctella Staint. Fairly common.

Elachista luticomella Zell. Three specimens 15.vi.1955.

E. alpinella Staint. Four specimens.

E. kilmunella Staint. One specimen 29.vi.1949.

E. nigrella Haw. Common.

E. exigua Frey. Common on the sandhills at Gwithian in April, 1955. This is a new record for England; the species was first recorded as British by J. D. Bradley in 1952 (*Ent. Gazette*, **3**: 185) when it was discovered in the Burren, Co. Clare, Ireland.

E. rhynchospora Staint. Two specimens 23.v.1949, 16.vi.1955.

E. dispunctella Dup. Fairly common on the coast. Also at The Lizard.

E. rufocinerea Haw.

E. cygnipennella Hübn.

SCYTHRIDAE

Scythris grandipennis Haw. One specimen 11.viii.1954.

HYPONOMEUTIDAE

Argyresthia pygmaeella Hübn. Common in one locality.

A. mendica Haw.

A. ephippella F.

A. albistria Haw.

Swammerdammia combinella Hübn.

S. caesiella Hübn. Fairly common.

S. pyrella Vill. Fairly common.

Prays curtisellus Don. One specimen 9.vii.1951.

Hyponomeuta vigintipunctata Retz. One specimen 31.vii.1948.

H. padella L. Very common. Also at The Lizard, where I have seen the blackthorn bushes completely defoliated by the larvae. The apple-feeding race also occurs in Cornwall.

H. cognatella Hübn. One specimen 1.viii.1953.

COLEOPHORIDAE

Coleophora spissicornis Haw. Two specimens.

C. vimenetella Zell.

C. fuscedinella Zell. One specimen 7.vii.1952.

C. juncicolella Staint. One specimen 29.vi.1952.

C. albidella H.-S.

C. discordella Zell. Widely distributed. Also recorded from Falmouth.

C. albicosta Haw.

C. argentula Zell. One specimen 9.vii.1949.

C. versurella Zell. Fourteen specimens were taken 1952-1953. This species was first recorded as new to the British list by my colleague J. D. Bradley (*Entomologist*, **92**: 27, 1959) after a specimen was taken at Chesil Bank, Dorset, in June, 1958. The species was rather plentiful in Cornwall and I could have taken more than I did.

C. taeniipennella H.-S. One specimen 20.vi.1952.

C. flaviginella Zell. Four specimens.

C. murinipennella Dup. Three specimens.

C. alticolella Zell. One specimen 30.vi.1953.

C. caespititiella Zell.

GRACILLARIIDAE

Lithocolletis messaniella Zell.
L. quercifoliella Zell.
L. ulicolella Staint. One specimen 19.vi.1953.
L. faginella Zell.
L. oxyacanthae Frey.
L. ulmifoliella Hübn. One specimen 12.vi.1949.
L. schreberella F. Common in one locality.
L. trifasciella Haw.
L. tristrigella Haw.
L. geniculella Rag. One specimen 10.v.1955.
Phyllocnistis suffusella Zell. In one locality only.
Ornix anglicella Staint.
O. avellanella Staint. Two specimens 24.vi.1949 and 2.v.1953.
O. torquillella Zell. Four specimens.
Gracillaria phasianipennella Hübn. Two specimens.
G. syringella F.
G. tringipennella Zell. Also recorded from Gwithian and The Lizard.
G. alchimiella Scop. One specimen 17.v.1951.
G. stigmatella F. Two specimens 9.v.1949 and 9.vii.1953.

EPERMENIIDAE

Epermenia illigerella Hübn. One specimen 2.vii.1955.
E. chaerophyllea Goeze.

PLUTELLIDAE

Cerostoma xylostella L.
C. nemorella L. Two specimens 19.vi.1948 and 5.vii.1953.
C. radiatella Don. One specimen 3.vii.1955.
C. vittella L. One specimen 13.ix.1955.
Plutella maculipennis Curt.
Acrolepia granitella Treits. Common.
A. pygmaeana Haw. Uncommon. Also two specimens were taken at Falmouth.

LYONETIIDAE

Opostega crepusculella Zell. In one locality.
Tischeria marginata Haw. Five specimens.

TINEIDAE

Myrmecozela ochraceella Tengst. One specimen 21.vi.1954.
Monopis rusticella Hübn.
M. imella Hübn.
M. crocicapitella Clem.
Meesia argenticimiculella Staint. Two specimens 12.vii.1949, and 20.vii.1950.
Tinea cloacella Haw.
T. pellionella L.
T. pallescentella Staint. Two specimens.
T. semifulvella Haw. Fairly common.
Teichobia verhuellella Staint. In one locality.

Ochsenheimeria birdella Curt. One specimen 12.ix.1955, also one from Helston 28.vii.1950.

LAMPRONIIDAE

Incurvaria muscalella F.

Lampronia quadripunctella Steph. Two specimens 9.vi.1951 and 10.vi.1955.

ADELIDAE

Nemotois degeerella L. One specimen at Falmouth 11.vi.1955.

Adela viridella Scop.

A. croesella Scop. One locality.

A. fibulella Schiff. Not uncommon.

Nemophora swammerdammella L.

N. schwarziella Zell.

NEPTICULIDAE

Nepticula pygmaeella Haw. Two specimens 24.iv.1949.

N. atricapitella Haw. One specimen 2.vi.1956.

N. aurella Staint.

N. sorbi Staint. One specimen 19.v.1949.

N. agrimonella H.-S. One specimen 9.vi.1955.

N. intimella Bell. Two specimens 19.vi. and 22.vi.1953.

HEPIALIDAE

Hepialus lupulina L.

H. sylvina L. One specimen 23.viii.1955.

H. humuli L. Including a male with markings in the forewings; it is similar to the form occurring in the Shetlands.

MICROPTERYGIDAE

Mnemonica subpurpurella Haw.

Micropteryx aruncella Scop.

A SURVEY OF THE COLLEMBOLA OF THE BURREN, Co. CLARE, IRELAND

By P. N. LAWRENCE

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Aided by a grant from the British Ecological Society, I was able to spend the first two weeks of July, 1960, hunting springtails in one of the finest examples of a Karst District of Europe, the Burren of Clare on the west coast of Ireland.

Despite bad weather, 150 samples from ten natural habitats yielded over 4,750 Collembola of about 60 species.

In Womersley's work on the Collembola of Ireland in 1930, 67 species are recorded from the whole country. Some of these are associated with more fertile acid soils or with higher altitudes than can be found in Clare. In the present paper are included species new to Ireland, new to Britain, or those which may, on comparison with more material, prove to be new to science.

By associating the known Collembola with their habitats it is hoped to stimulate more detailed ecological study.

The main types of habitat occurring in the area are as follows. Each of these may contain microhabitats which have food, predators and microclimates of their own.

- (1) SEASHORE: Intertidal mud, seaweed-covered rocks, tidal debris.
- (2) DRIFT VEGETATION: Farmland, clover meadow, hay-piles.
- (3) PAVEMENT VEGETATION: Dry mosses, grasses.
- (4) PAVEMENT CREVICES: Damp mosses, ferns.
- (5) HAZEL SCRUB: Rotten wood, fungi, humus of hazel, oak and ash.
- (6) HEATH COMMUNITY: Mosses, boulders.
- (7) CALLUNA COMMUNITY: Lichens, cliffs.
- (8) TURLoughs: Willow humus, occasionally flooded plants.
- (9) FEN LAND: Reeds, rushes, peat, lakes, islands.
- (10) SUBTERRANEA: Caves, pot-holes, pools, shade plants.

Some of the species were found in several microhabitats of one community, while others were found in similar microhabitats in different communities. Among the Collembola, too, are species which seem to be ubiquitous, and their present known distribution reflects only the distribution and movements of their collectors.

The characteristic limestone rock of the Burren, with the shallow alkaline soil, limits the growth of woodlands which would provide habitats for so many of the British Collembola. The deep cracks and sparse cover mean that the heavy rains quickly drain away, so that little shelter is provided for animals unable to tolerate extreme changes of humidity. In the wetter parts of the area the size of some of the lakes and turloughs changes rapidly and dramatically with each spell of showers or sunshine. The Collembola are unable to keep pace with the constantly advancing and retreating margins, and are flooded out or dried up too frequently to be able to establish

big populations. However, about 60 species of springtail survive in the Burren. A rare species, absent elsewhere in the area, may occupy a small island such as a rotten tree stump emerging from a fen, or a living moss cushion on a dry, bare rock.

To avoid crushing the live Collembola, the plastic bags containing samples of their microhabitats were carried in a pigeon-holed suitcase. Fifteen modified Berlese funnels were operated to drive the Collembola from these samples into tubes of alcohol by means of light, heat and desiccation.

I include notes and figures of some of the atypical, incompletely described, or newly recorded species among the following Collembola which were collected.

ARTHROPLEONA HYPOGASTRURIDAE

1. **Hypogastrura (Hypogastrura) purpurescens** (Lubbock, 1867)

Mottled purplish specimens ranging from 1.0 to 2.0 mm. long roughly agree with Bagnall's description of *Achorutes britannicus*, and I have compared them with syntypes of this species. It is noteworthy that despite his wide and enthusiastic collecting in Britain, there are no slides labelled *purpurescens* in Bagnall's collection at the British Museum, though there are many of *britannicus*. Bagnall (1940) separates *britannicus* from *purpurescens* by the former's longer empodial bristle and its lack of the sub-distal lateral tenent hairs on the tibio-tarsi of legs I and III. On examining Lister's specimens from the type series in Chislehurst Caves I found the empodial bristle to be no longer than that which Stach (1949) describes for *purpurescens*. Comparison of the tibio-tarsal setae of all the legs of Bagnall's material with *purpurescens* determined by Börner and Salmon as well as my Irish specimens, shows that there are always three hairs in the position of those on the middle legs (Figs. 2 and 3), but on the other legs the inner lateral hair is not always so long and clavate (Figs. 1 and 4). As pointed out by Goto (1953), the ratios of the antennal segments which Bagnall describes for *britannicus* are of little systematic value. The segments are not exactly cylindrical and they are slightly telescopic. When mounted, their apparent length and breadth vary with the amount of pressure applied to the cover slip. On specimens of Bagnall's *britannicus* the claw is often less broad than he describes and two pairs of lateral teeth may be present. The contiguous or sub-contiguous depressions described as holding the sensory rods of antenna III are sometimes united by a shallow fold as Goto suspected after he had studied specimens of *purpurescens* from Sussex. The comparison of this Sussex material with the Irish specimens, other examples in the British Museum and Bagnall's types of *britannicus* enables us to conclude with Goto and Gisin (1960) that *britannicus* is a synonym of *purpurescens*.

RECORDS:

Rotting hay, Ballyvaghan, P.N.L. 729.

Ivy humus, vertical cliff, Newtown Castle, P.N.L. 742.
 Moss around *Dryas*, Newtown Castle, P.N.L. 743.
 Moss by a stream, Slieve Elva, P.N.L. 778.

REFERENCES:

BAGNALL, R. S., 1940, *Ent. mon. Mag.* **76**: 168-169.
 STACH, J., 1949, *Acta Mon. H.n. Krakow*, 40-42, 101-110.
 GOTO, H. E., 1953, *J. Soc. Brit. Ent.*, **4**: 177-180.

FIGURES (Figs. 1-4):

Fig. 1. Apex of tibiotarsus, left hind leg, Edinburgh Gdn., iv.1935, *H. britannica*. Bagnall det.
 Fig. 2. Apex of tibiotarsus, median leg, Chislehurst Caves, viii.1938, *H. britannica*. Bagnall det. syntype.
 Fig. 3. Apex of tibiotarsus, median leg, Slieve Elva, P.N.L. 778.
 Fig. 4. Apex of tibiotarsus, right hind leg, Chislehurst Caves, viii.1938, *H. britannica*. Bagnall det., syntype.

2. **Hypogastrura (Ceratophysella) bentgssoni** (Ågren, 1904),
sensu Stach, 1949

The specimens from the Burren are not typical of the species, and show some of the characters of the closely related *sigillata*. I have collected similar specimens from England which also exhibit characters intermediate between the two species. They are a mottled brownish-yellow colour (cf. *bentgssoni*) and reach the length of 1.2 mm. The dens is thick and the tapering, when apparent, may be towards the apex (cf. *sigillata*) or the base (cf. *bentgssoni*) (Figs. 12-15). The anal papillae may be separate or touching, and the anal spines are sometimes strongly curved posteriorly (Fig. 10), while they are almost straight anteriorly in other specimens (Fig. 9). These spines vary from shorter to two and a half times longer than the papillae. Spines and papillae together measure from half (cf. *bentgssoni*) to equal (cf. *sigillata*) the length of the mucro, but only reach about half the length of the ventral side of the claw (cf. *bentgssoni*) (Figs. 9-11). The claw has an inner tooth and lateral teeth (cf. *sigillata*) (Fig. 11). The tip of the tibio-tarsal tenent hair varies from blunt to even more strongly clavate than that which Stach figures for *sigillata*. The longest bristles on the tergites reach only about one and a half times the length of the claw, but those on abdomen III-VI are weakly serrate. On a British specimen of *sigillata* determined by Bagnall these bristles are neither longer nor more serrate than those on the Irish specimens under discussion. The empodial appendage is often intermediate in proportion between those figured by Stach for *bentgssoni* and *sigillata*.

Unless they represent a new form, these specimens indicate a closer relationship between these two species. When more material has been studied they may prove to be at the ends of a range of intraspecific variation, in which case the familiar *bentgssoni* Ågren, 1904, would fall as a synonym of *sigillata* (Uzel, 1890).

RECORD:

Rotting grass mowings, Lough Inchiquin, P.N.L. 839.

REFERENCE:

STACH, J., 1949, *Acta Mon. Mus. H.n. Krakow*, 118-119; 142-151.
FIGURES (Figs. 9-15):

Fig. 9. Anal spines, Ireland, Clare, P.N.L. Coll. 839, *H. bentgssoni*.
Fig. 10. Anal spines, England, Middlesex, P.N.L. Coll. 13, *H. bentgssoni*.

Fig. 11. Left hind claw, Ireland, Clare, P.N.L. Coll. 839, *H. bentgssoni*.

Fig. 12. Dens and mucro, England, Low Fell, Bagnall det. *H. sigillata*.

Fig. 13. Dens and mucro, England, Middlesex, P.N.L. Coll. 13, *H. bentgssoni*.

Fig. 14. Dens and mucro, England, Cambridgeshire, P.N.L. Coll. 869, *H. bentgssoni*.

Fig. 15. Dens and mucro, Ireland, Clare, P.N.L. Coll. 839, *H. bentgssoni*.

3. ***Hypogastrura (Ceratophysella) armata* (Nicolet, 1841)**

The Irish specimens are not typical *armata sensu* Stach, 1949. Besides aberrant individuals with three or five teeth in the rami of the tenaculum or only a single anal spine, they resemble *denticulata* in some respects. The skin is not equally finely granulated, but the larger granules are not arranged in regular distinctly delimited areas. This species is possibly one of the world's commonest insects, yet comparison with other members of the group will be necessary before their identification can be confirmed.

RECORDS:

Moss (*Amblystegium serpens*) on bricks, Ballyvaghan, P.N.L. 716.

Rotten grass, Newtown Castle, P.N.L. 746.

Under cow dung, Black Head, P.N.L. 749.

Ash humus, Aghaglinny North, P.N.L. 762.

Flood debris, Lough Bunny, P.N.L. 813.

4. ***Hypogastrura (Schaefferia) emucronata* group**

In Stach's Key to the subspecies of this puzzling group, the Clare specimens run down to *longispina* under which name *octoculata* Womersley, 1930, from Wicklow, has been synonymized. A striking difference from *octoculata*, as figured by Womersley, is the much coarser granulation of the tergites (Fig. 7), particularly apparent on the anal papillae (Fig. 5). The post-antennal organ of the Clare specimens has much broader lobes than that figured for *octoculata* and an aberrant individual has five such lobes (Fig. 6). More material of this group from Ireland would be interesting to see, particularly if it is found in isolated colonies in caves. The group is subject to considerable variation and aberration, which may suggest or obscure developing sub-speciation.

RECORDS:

Moss (*Nechiera complanata*) on ground, Shesbia, P.N.L. 710.

Liverworts in ruin, Ballyvaghan, P.N.L. 717.

Ash humus, Aghaglinny North, P.N.L. 762.

REFERENCES:

LAWRENCE, P. N., 1959, *Trans. Cave Research Group of Great Britain*, **5**: 121-131.

GISIN, H., 1960, *Rev. Suisse Zool.*, **67**: 312-313.

FIGURES (Figs. 5-8):

Fig. 5. Anal papilla, anterior view, Sheshia, P.N.L. 710.

Fig. 6. Post antennal organ, Ballyvaghan, P.N.L. 717.

Fig. 7. Granulation of Abdomen III, Aghaglinny North, P.N.L. 762.

Fig. 8. Mucro and dens, Ballyvaghan, P.N.L. 717.

5. **Xenylla brevicauda** Tullberg, 1869, *sensu* Stach, 1949

The specimens from Clare agree fairly closely with Stach's full and well illustrated description. Womersley (1930) describes *brevicauda* as 'rather scarce and local', but I found it in considerable numbers concentrated in damp mosses. It was, however, quite absent from wet or dry mosses only two or three centimetres away in neighbouring samples.

RECORDS:

Moss on Ash root, Inchiquin Lough, P.N.L. 788.

Moss on meadow boulder, Vigo Cave, P.N.L. 802.

Moss on rock in lake, Bushy Island, Inchiquin Lough, P.N.L. 845.

Moss (*Climaciumpendroides*) on rock slab, Slatey Island, Inchiquin Lough, P.N.L. 849.

REFERENCES:

WOMERSLEY, H., 1930, *Proc. Roy. Irish Acad.*, **39B**: 168-169.

STACH, J., 1949, *Acta Mon. H.n. Krakow*, 217-223.

BRACHYSTOMELLIDAE

6. **Friesea mirabilis** Tullberg, 1871

Two species and their varieties of the genus *Friesea* have eight plus eight eyes and reduced furculae. Specimens referable to each of four named forms, *claviseta*, *emucronata*, *mirabilis* and *reducta*, were present in samples from the Burren. Occasionally two forms were living in the same microhabitat. On examining the key characters on which these forms are divided one finds that *reducta* and *emucronata* lack mucrones, *mirabilis* has mucrones at all stages of reduction up to a 'hook-like' development, while *claviseta* has the largest 'claw-like' mucrones. In *mirabilis* and *reducta* the tenent hairs are described as being pointed to blunt, in *emucronata* they are slightly clavate, while in *claviseta* these hairs are very distinctly clavate. Similarly the hairs on abdomen VI intergrade through these forms from pointed to blunt to clavate, and frequently two forms and intermediates are present in one sample. Though sometimes pure colonies of these forms may have been found elsewhere, it seems possible that *claviseta* and *emucronata* could be extreme ends of the range of variation of *mirabilis*. Until the problem can be finally settled by breeding *Friesea* under controlled conditions it is not possible to do more than guess the significance of the variation.

RECORDS:

Seaweed above high-water mark, Bell Harbour, P.N.L. 702.
Soil in cracks of limestone pavement, Abbey Hill, P.N.L. 707.
Liverworts on ruined floor, Ballyvaghan, P.N.L. 717.
Roots of fen grasses, Lough Turkenagh, P.N.L. 822.

7. **Brachystomella parvula** (Schäffer, 1896)

RECORD:

Moss by stream, Slieve Elva, P.N.L. 778.

PSEUDACHORUTIDAE

8. **Pseudachorutes boernerii** Schött, 1902

A single specimen referred to this species is the first to be recorded from the British Isles. It was described from Sweden, and has been found in Poland and Switzerland, besides having a subspecies in North America. Here follows a brief illustrated description, especially of the atypical features, so that the species may be recognized again. Length, 0.65 mm. (Fig. 26); colour, bluish grey. The clothing is sparse, mainly of short setae in two transverse rows on the tergites among coarse granules (Fig. 17). The cell structure of the cuticle gives these granules the appearance of being tubercles of minute granules. The longer, clavate setae of the tergites are weakly developed on abdomen I, but from abdomen II to VI they become increasingly longer and more clavate (Figs. 21-25). The two small, upward-hooked sense rods of antenna III are guarded by two widely spaced sensory hairs. Fourth antennal segment with retractile sensory papilla and about six olfactory hairs not distinctly different from the common setae. Subapical pit with small papilla (Fig. 16). Mandible long with two apical teeth, maxilla needle-like, detailed structure not resolved (Fig. 29). Eight eyes on each side of the head with the six tubercles of the post antennal organ about one and a half times the diameter of an eye (Fig. 30). Claw stout and untoothed (Fig. 19). Only a single hair longer and clavate on each tibio-tarsus (Fig. 20). Furcula reduced (Fig. 18), shorter than the claw and about six times shorter than the antennae. Dens with four setae. Mucro spoon-like, with hooked tip and high outer lamella (Fig. 28). Male genital area with sixteen setae (Fig. 27).

The specimen is interesting in that it shows characters intermediate between *boernerii* and *americanus* besides those peculiar to itself. When more material is available it may be necessary to reassess the significance of these characters.

RECORD:

Ferns in vertical rock wall under bushes, Lough Inchiquin, P.N.L. 790.

REFERENCE:

STACH, J., 1949, *Acta Mon. H.n. Krakow*, 115-119.
FIGURES (Figs. 16-33):

Fig. 16. Third and fourth antennal segments.

Fig. 17. Granules and a seta of thoracic tergite.

Fig. 18. Furcula and tenaculum.
 Fig. 19. Hind claw and apex of tibio-tarsus.
 Fig. 20. Apex of median tibiotarsus.
 Fig. 21/25. Clavate setae from abdomen II-VI.
 Fig. 26. Whole male animal.
 Fig. 27. Male genital area.
 Fig. 28. Mucro.
 Fig. 29. Mandible and maxilla.
 Fig. 30. Eyes and post antennal organ.
 Fig. 31. Granules bordering ventral thoracic furrow.
 Fig. 32. Chaetotaxy of dorsal surface of abdomen VI.
 Fig. 33. Chaetotaxy of collophore.

Figs. 16, 18, 27, 30, 32 and 33 are drawn to same scale.

Figs. 17, 19-25, 28, 29 and 31 are drawn to same scale.

ANURIDAE

9. *Micranurida pygmaea* Börner, 1901

RECORD:

Under pile of peat, Lough Turkenagh, P.N.L. 823.

10. *Anurida granaria* (Nicolet, 1847) *sensu* Denis, 1947

RECORDS:

Hawthorn humus, Sheshia, P.N.L. 712.

Soil in rock crevice, Lough Inchiquin, P.N.L. 791.

Pool in entrance, Vigo Cave, P.N.L. 855.

11. *Anurida maritima* (Guerin, 1836)

RECORD:

Bell Harbour, intertidal mud, between wrack-grown rocks, P.N.L. 701.

NEANURIDAE

12. *Neanura muscorum* (Templeton, 1835)

RECORD:

Sycamore humus, Newtown Castle, P.N.L. 733.

ONYCHIURIDAE

13. *Onychiurus ambulans* group.

RECORDS:

Under straw, Aghaglinny North, P.N.L. 758.

Pool deep in cave, Vigo Cave, P.N.L. 856.

14. *Onychiurus armatus* group

RECORDS:

Liverworts on floor of ruin, Ballyvaghan, P.N.L. 717.

Grass between rocks, Ballyvaghan, P.N.L. 727.

Grass under dung, Black Head, P.N.L. 749.

Moss (*Climacium dendroides*) on rock slab, Slatey Island, Lough Inchiquin, P.N.L. 849.

The above two species, although almost typical, exhibit arrangements of their pseudocelli which do not fit exactly into the existing species descriptions. Until more is known about the range of variation of this character I do not feel justified in extending the description

of any of the named forms or in describing the present material as new.

15. **Onychiurus burmeisteri** (Lubbock, 1873)
RECORD:

Under moss-grown bricks, Ballyvaghan, P.N.L. 716.

16. **Onychiurus spinosus** (Bagnall, 1949)

The length of the single specimen which I examined was about 0.75 mm. Among the large body and head granules, which reached nearly half the diameter of the pseudocelli they surrounded, are outstanding straight setae almost twice as long as the claws.

There are approximately fourteen compound vesicles in the post antennal organ (Fig. 37), and the two smooth curved sense rods and erect pins of antennal segment III are guarded by five papillae each with a seta at its base. On the fourth antennal segment, just above the sense organ of the third, is a large sense pin in a depression (Fig. 41).

The arrangement of the pseudocelli was difficult to resolve, but apparently 31/111/12220. On abdomen V between each of the pairs of pseudocelli is a sense rod (Fig. 42) over half the length of the straight anal spines which are only a little shorter than the claw. On abdomen IV, in the same position, is a sense rod only half the length of that on abdomen V together with an additional pair of rods each placed antero-dorsally. This arrangement is also present on abdomen III. On abdomen II, where the pseudocelli are more spaced, these rods are absent or little differentiated from the common setae. However, one structure on this segment is much shorter and thicker than its normal opposite seta.

Although this unique animal is distinct from other species of *Onychiurus*, I do not feel justified in describing it as new, as it agrees closely with *spinosus* (Bagnall), a species originally from Co. Down, of which no material is available. Originally *spinosus* was placed in the genus *Onychiurodes*, but Salmon (1959) transfers it to *Paronychiurus*, while (Gisin, 1960) calls it a species *dubiosa*. Further collecting in Ireland may result in the reinstatement of this interesting species.

RECORD:

Moss under Hawthorn, Sheshia, P.N.L. 710.
REFERENCE:

BAGNALL, R. S., 1949, *Ent. mon. Mag.*, **85**: 51.

FIGURES (Figs. 34-45):

Fig. 34. Apical papilla of antenna IV.

Fig. 35. Whole animal. Sketch to show shape and general distribution of pseudocelli and some setae.

Fig. 36. Pseudocellus at antennal base among smaller granules surrounded by larger ones.

Fig. 37 Post antennal organ.

Fig. 38. Distinct pseudocellus from hind margin of head.

Fig. 39. Hind claw.

Fig. 40. Anal spine.
 Fig. 41. Sense organ of antenna III.
 Fig. 42. Sense hair of abdomen V with two pseudocelli.
 Fig. 43. Sense hair, posterior, abdomen IV with one of the pseudocelli.
 Fig. 44. Sense hair, anterior, Abdomen IV.
 Fig. 45. Common body seta, abdomen IV.

All figures except Fig. 35 drawn to same scale.

17. **Tullbergia (Metaphorura) affinis** Börner, 1902

RECORDS:

Soil in cracks in limestone pavement, Abbey Hill, P.N.L. 707.

18. **Tullbergia (Mesaphorura) krausbaeuri** (Börner, 1901)

RECORDS:

Moss under Hawthorn, Sheshia, P.N.L. 710.

Rotting grass, Drumnoan, P.N.L. 718.

Rotting grass, Newtown Castle, P.N.L. 746.

ISOTOMIDAE

19. **Tetraclantha brittanica** Cassagnau, 1959

This species has not previously been recorded from Ireland, though it is possible that some early identifications of *wahlgreni* may refer to *brittanica*.

RECORDS:

Lichen on wall, Ballyvaghan, P.N.L. 813.

Moss on shore, Bushy Island, Inchiquin Lake, P.N.L. 840.

REFERENCE:

CASSAGNAU, P., 1959, *Mem. Mus. Nat. Hist. nat.*, **16**: 232-234.

20. **Anuroporus laricis** Nicolet, 1842

The long outstanding body setae vary from pointed to blunt, to distinctly clavate. Clavate setae were formerly suspected of being indicative of separate subspecific status.

RECORDS:

Moss on old Sycamore, Newtown Castle, P.N.L. 732.

Moss on Ash trunk, Aghaglinny North, P.N.L. 761.

Moss on fallen tree, Vigo Cave, P.N.L. 797.

Lichens up trees, Bushy Island, Inchiquin Lough, P.N.L. 843.

21. **Folsomia fimetaria** group

This very plastic cosmopolitan group has been split into species on the basis of characters which have recently been shown to vary according to conditions of humidity, heat or merely at random. It is not possible to identify them at present.

RECORD:

Under straw, Aghaglinny North, P.N.L. 759.

22. **Folsomia quadrioculata** (Tullberg, 1871)

One of the most widely distributed species in the Burren, this cosmopolitan animal is probably one of the world's commonest insect species.

RECORDS:

Dried seaweed, Bell Harbour, P.N.L. 703.
 Pavement crevices, Abbey Hill, P.N.L. 708.
 Rotten wood, Poll Elva, P.N.L. 767.
 Moss by stream, Slieve Elva, P.N.L. 778.
 Ivy humus, Lough Inchiquin, P.N.L. 836.

23. **Isotomiella minor** (Schäffer, 1896)

RECORDS:

Willow humus, Mortyclogh, P.N.L. 705.
 Pavement crevices, Abbey Hill, P.N.L. 707.
 Moss on stump, Newtown Castle, P.N.L. 736.

24. **Subisotoma angularis** (Axelson, 1905)

RECORD:

Moss and lichens on small rocks in *Dryas* zone. Newtown Castle,
 P.N.L. 744.

25. **Proisotoma minuta** (Tullberg, 1871)

RECORD:

Lawn mowings, Lough Inchiquin, P.N.L. 839.

26. **Ballistrura crassicauda** (Tullberg, 1871)

RECORD:

Moss on rocky shore, Lough Bunny, P.N.L. 812.

27. **Ballistrura schoetti** (Dalla Torre, 1895)

RECORD:

Moss by turlough, Mortyclogh, P.N.L. 706.

28. **Isotoma (Pseudisotoma) sensibilis** (Tullberg, 1876)

This species was very common and abundant throughout the Burren, but confined mainly to mossy habitats.

RECORDS:

Moss on limestone pavement, Ballyvaghan, P.N.L. 723.
 Moss deep in pavement crevice, Ballyvaghan, P.N.L. 724.
 Moss on old sycamore, Newtown Castle, P.N.L. 732.
 Lichen around thistle, Black Head, P.N.L. 753.
 Moss in pothole, Poll Elva, P.N.L. 765.
 Moss on Beech, Slieve Elva, P.N.L. 776.

29. **Isotoma notabilis** Schäffer, 1896

RECORDS:

Ivy humus under cliff, Newtown Castle, P.N.L. 742.
 Under straw Aghaglinny North, P.N.L. 759.
 Flood debris, Lough Bunny, P.N.L. 813.
 Moss under Oak, near Corofin, P.N.L. 817.

30. **Isotoma viridis** Bourlet, 1839

RECORDS:

Grass between limestone pavement, Abbey Hill, P.N.L. 708.
 Pennywort by turlough, Lough Luirk, P.N.L. 713.
 Moss on bricks, Drumnoan, P.N.L. 716.
 Rotting hay, Ballyvaghan, P.N.L. 729.
 Moss in stump, Lough Cullaun, P.N.L. 831.

31. **Isotoma olivacea** Tullberg, 1871

RECORD:

Hay humus, Lough Inchiquin, P.N.L. 838.

32. *Isotoma violacea* Tullberg, 1876

This species and *olivacea* are often found together and the forms may prove to be extreme ends of a range of intraspecific variation.

RECORD:

Rotting hay, Ballyvaghan, P.N.L. 729.

33. *Isotomurus palustris* (Müller, 1776)

Some of the specimens are interesting in that they show weakly to moderately plumose body setae such as I have found on species of this genus from Labrador, Canada. These setae are used as a key character in separating species groups of *Isotomurus* which occur on either side of the Atlantic. In addition an odd dorsal tooth is sometimes present on the claw.

RECORDS:

Moss by turlough, Lough Luirk, P.N.L. 713.

Moss by pool on cliff, Black Head, P.N.L. 752.

Algae at water's edge, Lough Inchiquin, P.N.L. 780.

Moss on rocky shore, Lough Bunny, P.N.L. 811.

Moss by pools in fen, Lough Cullaun, P.N.L. 821.

ENTOMOBRYIDAE

34. *Entomobrya albocincta* (Templeton, 1835)

RECORDS:

Moss, lichens on wall, Ballyvaghan, P.N.L. 731.

Moss, lichens on wall, Newtown Castle, P.N.L. 739.

35. *Mesentomobrya dollfusi* (Denis, 1924)

RECORD:

Thrift in cliff, Black Head, P.N.L. 748.

FIGURES (Figs. 72-79):

Fig. 72. Whole animal 1.2 mm. long.

Fig. 73. Setae, antenna IV.

Fig. 74. Apical papilla, antenna IV.

Fig. 75. Trochanteral organ.

Fig. 76. Eye patch.

Fig. 77. Fore claw.

Fig. 78. Mucro.

Fig. 79. Mid-claw.

36. *Entomobrya nicoleti* (Lubbock, 1867)

RECORD:

Rotting hay, Ballyvaghan, P.N.L. 729.

37. *Entomobrya nivalis* (Linné, 1758)

RECORDS:

Moss on rocks, Sheshia, P.N.L. 711.

Lichen up trees, Bushy Island, Inchiquin Lake, P.N.L. 843.

38. *Orchesella cincta* (Linné, 1758)

RECORDS:

Moss on rock, Newtown Castle, P.N.L. 735.

Ash humus, Ághaglinny North, P.N.L. 762.

39. **Orchesella alticola** Uzel, 1890

I have compared the Irish specimens with the type of *Entomobrya anomala* Carpenter, 1906, kindly lent by the National Museum of Ireland. Unfortunately the single specimen on which Carpenter's description was based is now in very poor condition.

Colour pattern and small structural details can no longer be resolved, but the ratios and sizes of the antennae, legs and furcula are very close to those of *Orchesella alticola* from Co. Clare. Carpenter's specimen is labelled 'Orchesella alticola Uzel f. obscura, E.H., 1924', but in its present condition cannot be positively referred to this species. Further material from the type locality at Fair Head, Co. Antrim, may finally settle the dubious identity of this species.

REFERENCE:

CARPENTER, G. H., 1906, *Sci. Proc. Roy. Dublin Soc.*, **2**:39-42 (Figs.).

RECORD:

Under stones on cliffs, Newtown Castle, P.N.L. 740.

FIGURE (Fig. 80):

Fig. 80. Whole animal 2.1 mm. long to show colour pattern.

40. **Heteromurus nitidus** Templeton, 1835

RECORDS:

Ivy humus, under cliff, Newtown Castle, P.N.L. 742.

Pool in pothole, Pollnagollum, P.N.L. 769.

Liverwort in cave, Vigo Cave, P.N.L. 795 and 801.

Lawn mowings, Lough Inchiquin, P.N.L. 839.

41. **Lepidocyrtus cyaneus** Tullberg, 1871

RECORDS:

Liverwort on ruin, Drumnoan, P.N.L. 717.

Moss on old Sycamore, Newtown Castle, P.N.L. 732.

42. **Lepidocyrtus lanuginosus** (Gmelin, 1788)

RECORDS:

Grass between rocks, Drumnoan, P.N.L. 727.

Rotting hay, Ballyvaghan, P.N.L. 729.

Sycamore humus, Newtown Castle, P.N.L. 733.

43. **Pseudosinella alba** (Packard, 1873)

RECORDS:

Hawthorn humus, Sheshia, P.N.L. 712.

Hazel humus, Ballyvaghan, P.N.L. 720.

Sycamore humus, Newtown Castle, P.N.L. 733.

Oak humus, Corofin, P.N.L. 817.

44. **Tomocerus minor** (Lubbock, 1862)

RECORDS:

Under bricks, Drumnoan, P.N.L. 716.

Rotting hay, Ballycaghan, P.N.L. 729.

Under cliff, Newtown Castle, P.N.L. 740.

Rotting hay, Lough Inchiquin, P.N.L. 838.

SYMPHYPLEONA
NEELIDAE

45. *Neelus murinus* Folsom, 1896

RECORDS:

Liverwort on pothole wall, Poll Elva, P.N.L. 795.

Liverwort on cave floor, Vigo Cave, P.N.L. 801.

* **46. *Megalothorax minimus* Willem, 1900**

RECORD:

Hawthorn humus, Shesha, P.N.L. 712.

SMINTHURIDAE

47. *Arrhopalites* spp.

Arrhopalites is a genus often found underground. A number of species are described only from single caves and are represented by only a few individuals. The differences between some of these isolated populations are small and the commoner epigean species are known to be variable within larger populations, and over the range of their distribution. It is possible, therefore, that some of the subterranean specimens may not be specifically distinct.

One of the characters forming the basis for separating the described forms at present is the shape of the female anal appendage. This structure varies in outline by orientation in a single individual till the extremes are practically identical with those of related forms. Its curling, finely fringed forks are extremely difficult to resolve accurately, especially in lateral view (Figs. 69 and 71). The character separating the *furcatus-ornatus* from the *pygmaeus* group is the presence in the former of a distinct papilla on antenna III. In the Clare specimens this structure is present but sometimes poorly developed, thus linking these two groups (Fig. 59). Another character used in specific separation is the subsegmentation of antenna IV. Apart from one immature form which has no trace of subsegments and another which has distinctly six, it is difficult to decide whether or not the Clare specimens might be described as having more than the clearly visible five subsegments (Figs. 61 and 63). The teeth in the claw are variously developed, but commonly there is a pair of lateral teeth and a single inner tooth on both the unguis and the unguiculus.

The Irish specimens strongly resemble species known only from France, Spain and Yugoslavia, but until more material can be collected and compared I do not feel justified in fitting them to any of the existing descriptions or in describing them as new.

RECORDS:

Moss between rocks, Ballyvaghan, P.N.L. 721.

Moss on pothole wall, Pollnagollum, P.N.L. 768.

Liverwort on cave wall, Vigo Cave, P.N.L. 795.

FIGURES (Figs. 59-71):

Fig. 59. Papilla of antenna III (721).

Fig. 60. Single eye and part of antenna I (721).

Fig. 61. Antenna IV (721).

Fig. 62. Antenna IV (795).
 Fig. 63. Antenna IV (768).
 Fig. 64. Tenaculum (768).
 Fig. 65. Fore claw (721).
 Fig. 66. Mucro (721).
 Fig. 67. Mucro (768).
 Fig. 68. Hind claw (768).
 Fig. 69. Female anal appendage (721).
 Fig. 70. Median subsegment Ant. IV (721).
 Fig. 71. Female anal appendage (768).

REFERENCES:

STACH, J., 1945, *Acta Mus. Hist. natur. Akad. Pol. Nr.*, 1: 1-47 (10 plates).
 CASSAGNAU, P., & DELAMARE DEBOUTTEVILLE, C., 1953, *Notes Biospeologiques*, 8: 133-147.

48. **Sminthurides malmgreni** (Tullberg, 1876)

RECORD:

Moss on pothole floor, Pollnagollum, P.N.L. 771.
 49. **Sminthurides schoetti** (Axelson, 1903)

RECORDS:

Moss by peat pool, Corofin, P.N.L. 820.
 Moss among reeds, Lough Atedaun, P.N.L. 825.
 50. **Sminthurides parvulus** (Krausbauer, 1898)

RECORDS:

Moss in pothole, Pollnagollum, P.N.L. 771.
 Liverwort in cave, Vigo Cave, P.N.L. 801.
 Moss by peat pool, Corofin, P.N.L. 820.
 Moss by lily in ditch, Lough Begg, P.N.L. 832.
 51. **Sphaeridia pumilio** (Krausbauer, 1896)

RECORDS:

Rotten grass by ditch, Newtown Castle, P.N.L. 746.
 Moss on Ash root, Lough Inchiquin, P.N.L. 788.
 Flood debris on grass, Lough Bunny, P.N.L. 813.
 Moss on rock slab, Slatey Island, Lough Inchiquin, P.N.L. 849.
 52. **Sminthurinus aureus** (Lubbock, 1862)

RECORDS:

Lawn mowings, Lough Inchiquin, P.N.L. 839.
 Moss between rushes, Slatey Island, Lough Inchiquin, P.N.L. 853.
 53. **Sminthurinus niger** (Lubbock, 1867)

RECORDS:

Moss on rocks, Drumnoan, P.N.L. 726.
 Moss between rushes, Slatey Island, P.N.L. 853.
 54. **Sminthurinus elegans** (Fitch, 1863)

RECORD:

Moss on rocks, Sheshia, P.N.L. 711.
 55. **Heterosminthurus novemlineatus** (Tullberg, 1871)

RECORD:

Moss by lily in ditch, Lough Begg, P.N.L. 832.
 56. **Bourletiella lutea** (Lubbock, 1867)

RECORD:

Clover and grass, Drumnoan, P.N.L. 728.

57. **Deuterosminthurus repandus** (Ågren, 1903)

RECORD:

Clover in meadow, Aghaglinny North, P.N.L. 763.

58. **Sminthurus marginatus** (Schött, 1893)

The Irish specimens are interesting in that they exhibit an indistinct colour pattern (Fig. 47) like the other two members of this group, *echinatus* Stach and *bremondi* Delamare Deboutteville and Bassot. The former is separated from the plain *marginatus* solely by its colour markings, though Denis (1947) describes *marginatus* from Corsica with an indistinct pattern. A similar specimen to that described by Denis was collected in Corsica in 1960 by Dr. Theresa Clay. In 1955 I found a single example, which Goto identified, on a tree stump in Kent, England. Almost exactly five years later careful searching on the same tree stump led to the capture of a second specimen. These, with the two Irish examples collected separately by Mrs. J. D. Bradley and the author, suggest an even closer relationship between the three species. Thanks to the kindness of Dr. Maria da Gama, of the University of Coimbra, Portugal, who lent me her specimens of *bremondi* determined by Gisin, I was able to compare that species with the British *marginatus*.

The chaetotaxy of the head is very similar to that figured for *bremondi* (Fig. 51). A similar minute sense peg is present on antenna IV (Fig. 54). The degree of development of the pseudonychia is variable, as is the height of the tunica (Figs. 56 and 58). The base of the mucro is thickened and sometimes forms a scale or spine-like structure (Figs. 52 and 55). The mucronal seta is sometimes absent.

The three species of *Sminthurus* forming the *marginatus* group are known from Poland, the Ukraine, Portugal and Spain. The newly recorded occurrences in England and Ireland suggest that they may be more widely distributed. When more material is collected it may be necessary to reassess the significance of the characters used to separate the species.

RECORDS:

Liverworts in entrance, Vigo Cave, P.N.L. 801.

Cave entrance, Poll-an-Ionian, Mrs. J. D. Bradley Coll. 913.

REFERENCES:

DENIS, J. R., 1947, *Ann. Sci. Nat.*, **2**:10-12.

DELAMARE DEBOUTTEVILLE, C., & BASSOT, J.-M., 1957, *Vie et Milieu*, **7**:80-83.

FIGURES (Figs. 46-58):

Fig. 46. Mucro. T. Clay Coll. 917 (Corsica).

Fig. 47. Colour pattern, Mrs. J. D. Bradley Coll. 913.

Fig. 48. Chaetotaxy (appx.), P.N.L. 801.

Fig. 49. Mucro, P.N.L. 801.
Fig. 50. Setae of vertex, P.N.L. 342 (Kent).
Fig. 51. Chaetotaxy of head, Mrs. J. D. Bradley Coll. 913.
Fig. 52. Mucronal 'scale', P.N.L. 342.
Fig. 53. Female anal appendage, P.N.L. 342.
Fig. 54. Apex of antenna, P.N.L. 342.
Fig. 55. Mucronal 'scale', P.N.L. 342.
Fig. 56. Fore claw, P.N.L. 801.
Fig. 57. Sense organ antenna III, P.N.L. 342.
Fig. 58. Hind claw, P.N.L. 801.
59. **Sminthurus viridis** (Linné, 1758)

RECORD:

Clover in meadow, Aghaglinny North, P.N.L. 762.

DICYRTOMIDAE

60. **Dicyrtomina minuta** (Fabricius, 1783)

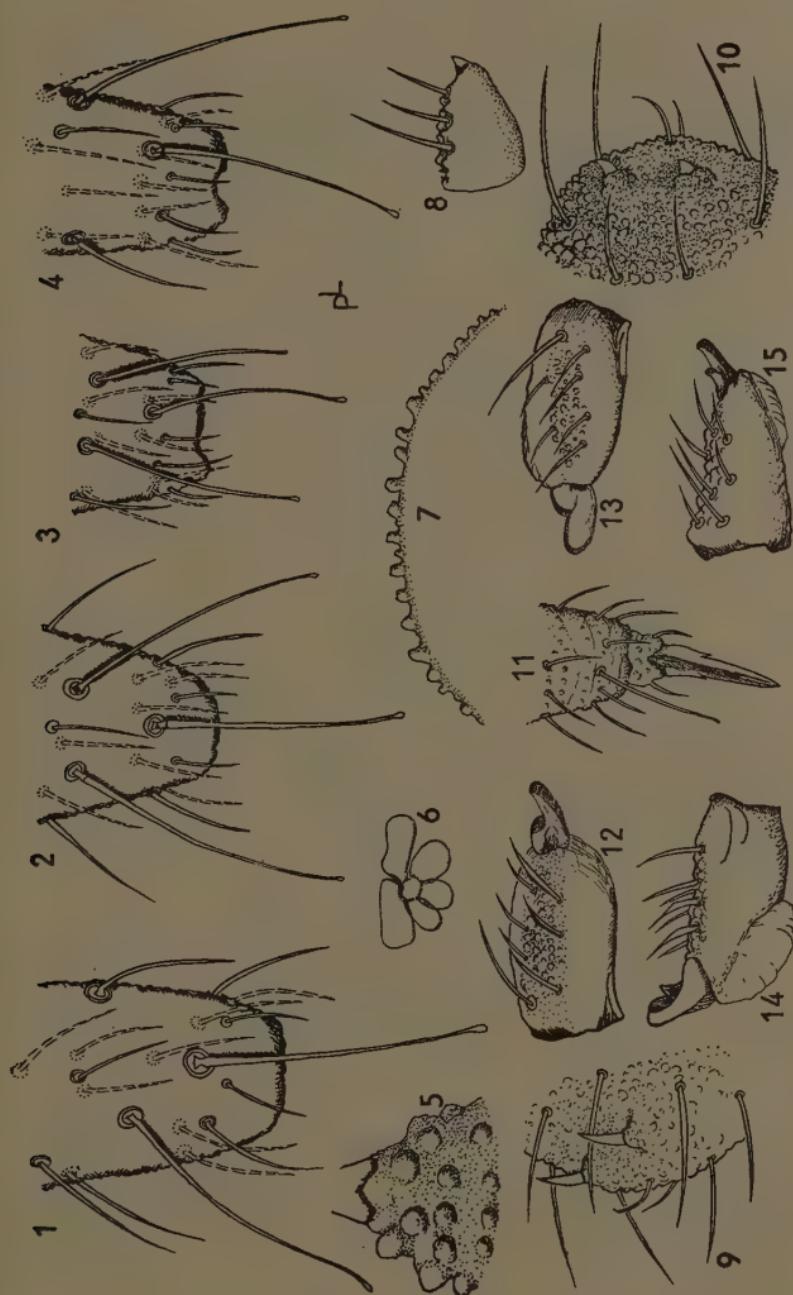
RECORD:

Humus in pothole, Poll Elva, P.N.L. 766.

ACKNOWLEDGMENTS

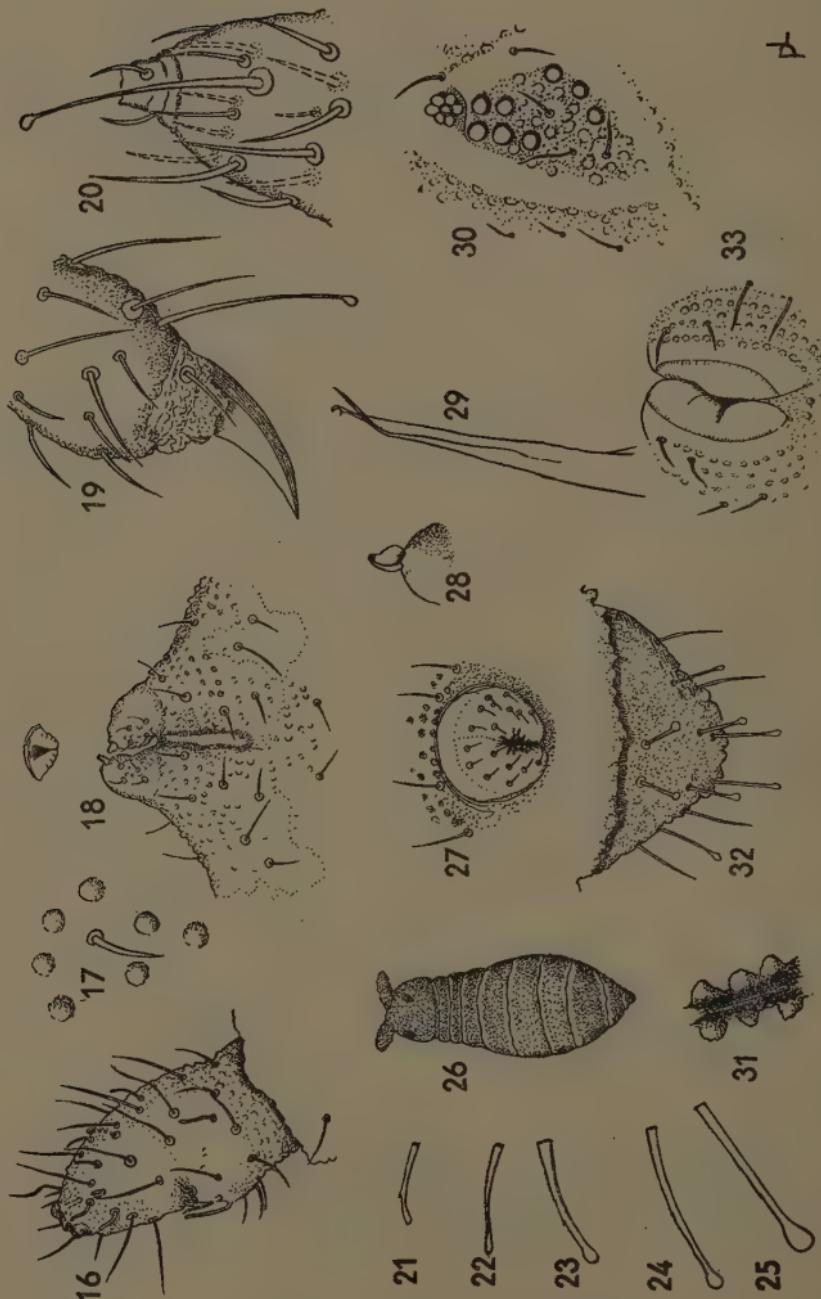
I am grateful to the Trustees of the British Museum (Natural History) for granting leave for, and the British Ecological Society for the means of, carrying out this preliminary survey. Most of the specimens are in the British Museum, but I have sent a small representative collection to the Dublin Museum in the hope of encouraging Irish workers to study this interesting element of their native fauna.

My thanks too are due to my colleague, Mr. Ralph Coe, who rowed me across Inchiquin Lough in rough weather, and who introduced me to the traditional Irish hospitality which awaits visiting entomologists in County Clare.

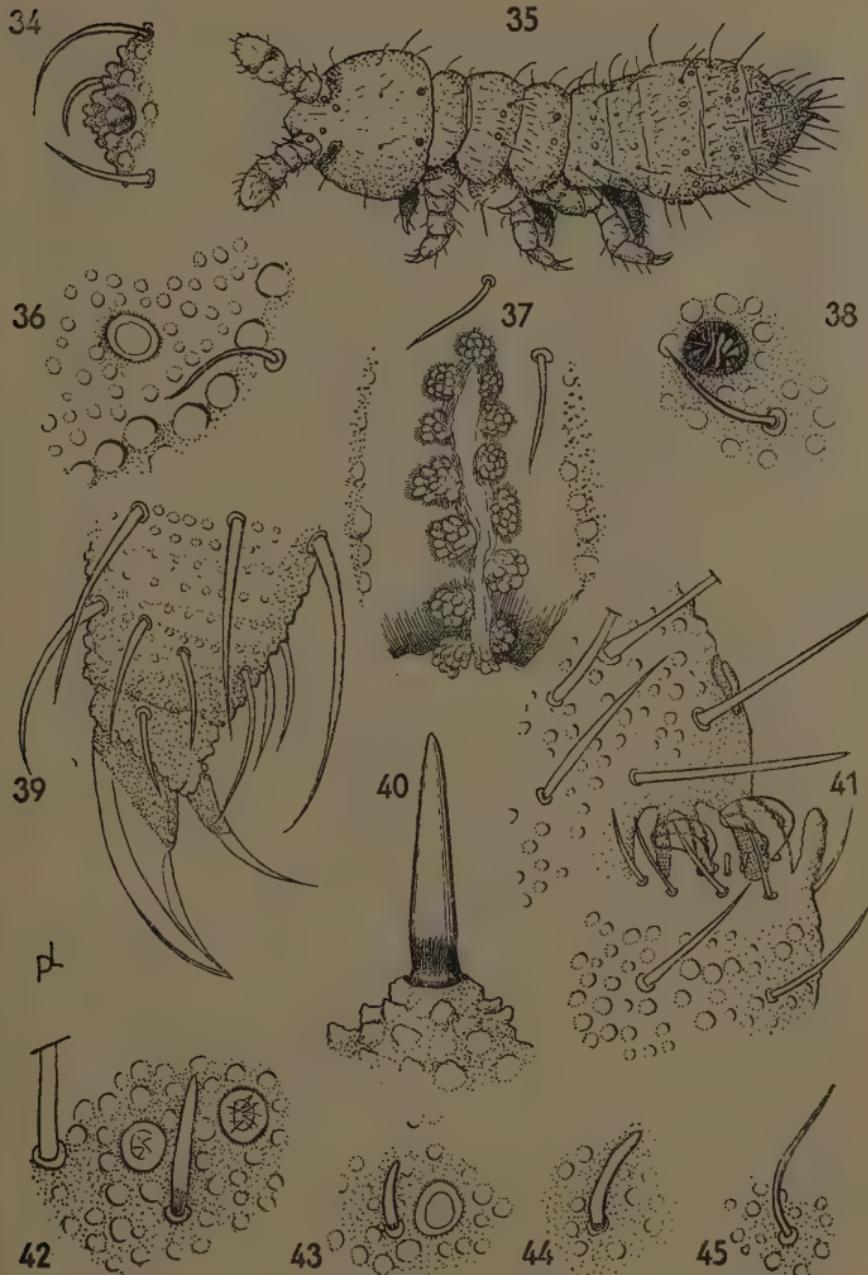


COLEMBOLA: HYPOGASTRURIDAE.

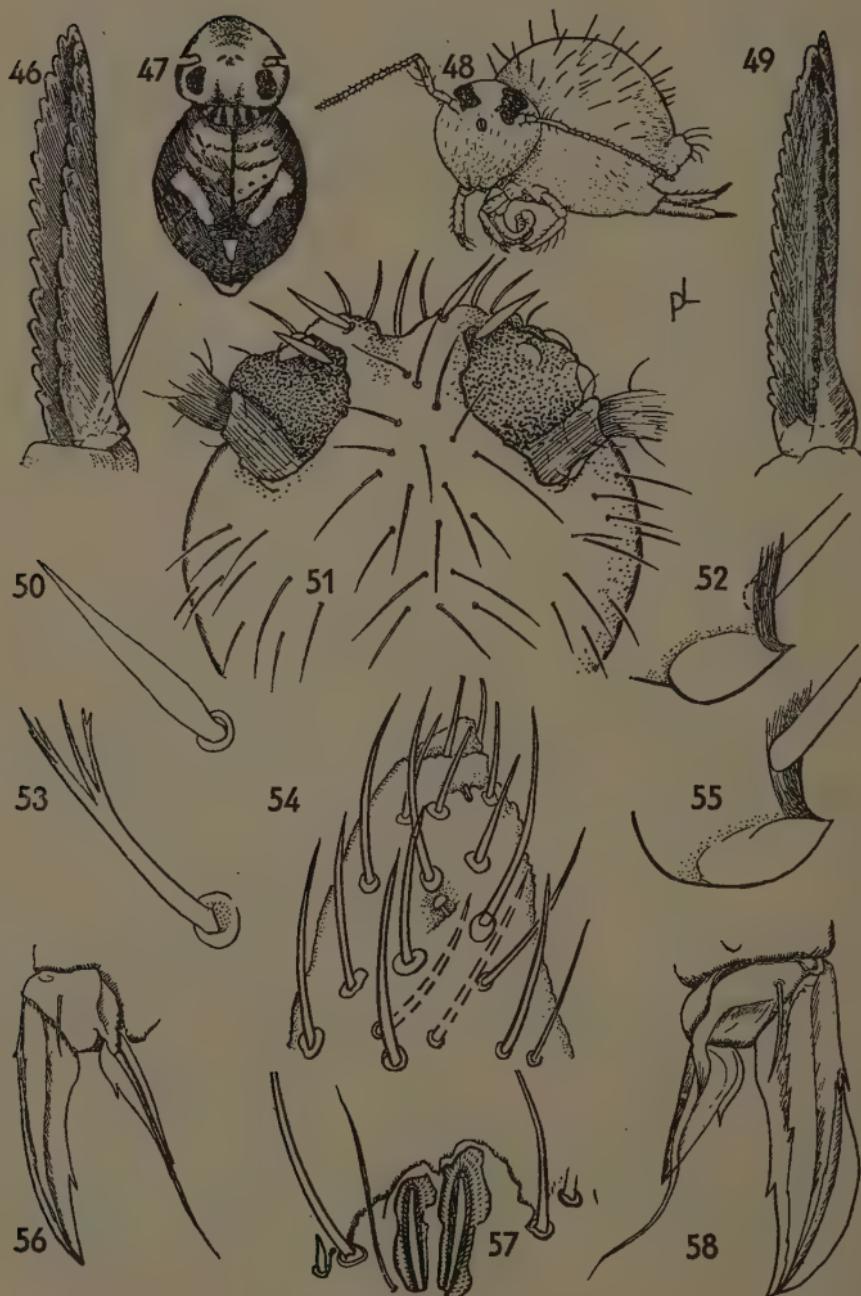
Figs. 1-15. See text for details.

COLLEMBOLA: *Pseudachorutes boernerri* Schött.

Figs. 16-33. See text for details.

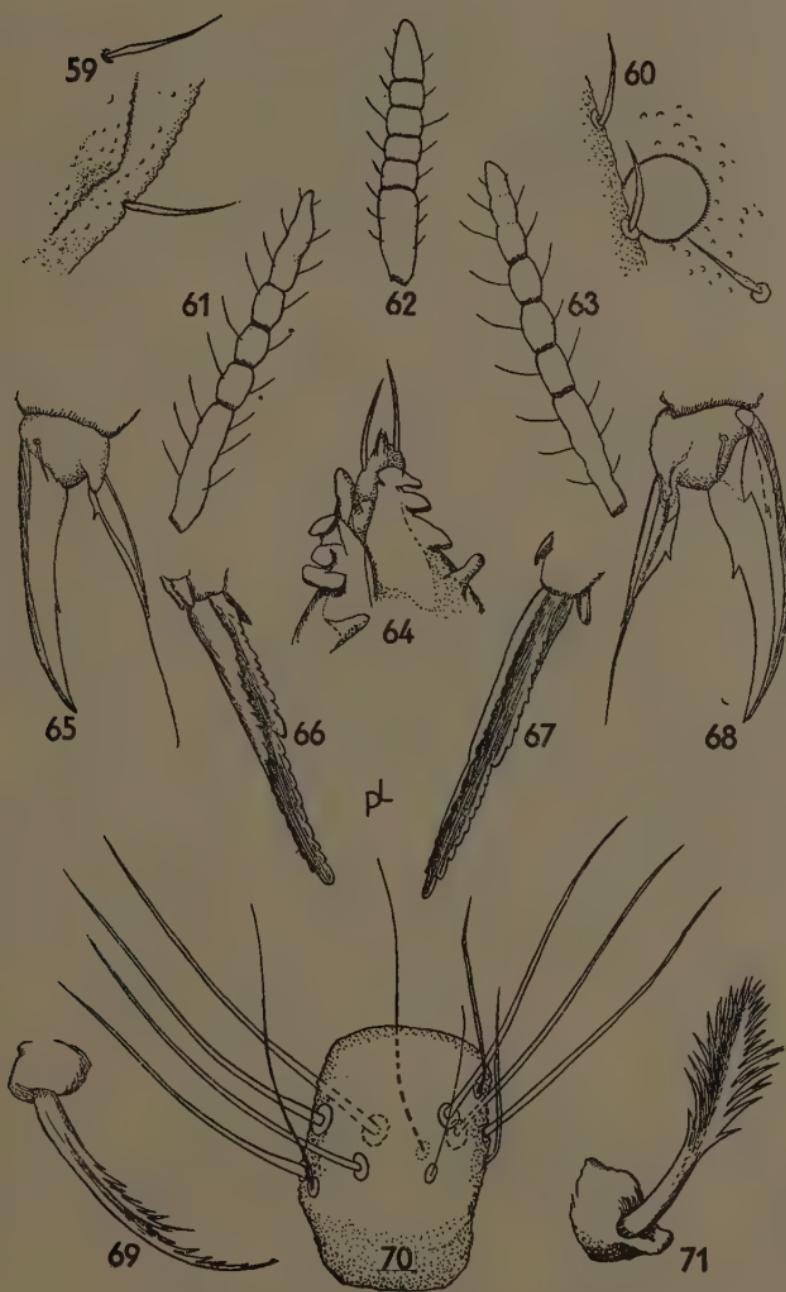
COLEMBOLA: *Onychiurus spinosus* (Bagnall).

Figs. 34-45. See text for details.

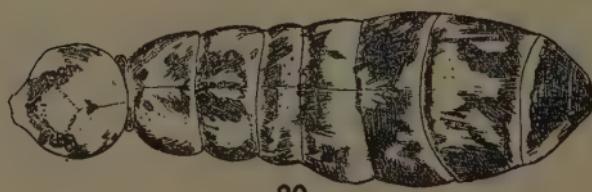
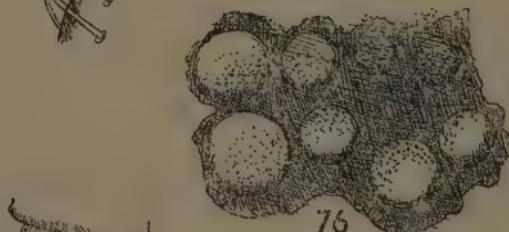
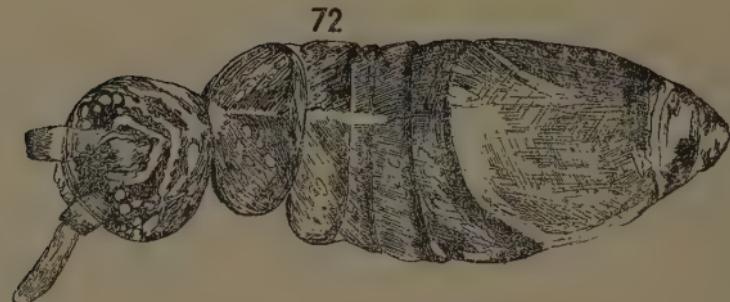


COLLEMBOLA: *Sminthurus marginatus* (Schött).

Figs. 46-58. See text for details.

COLEMBOLA: *Arrhopalites* spp.

Figs. 59-71. See text for details.



COLLEMBOLA: ENTOMOBRYIDAE.

Figs. 72-80. See text for details.

BOOK REVIEWS

Proceedings and Transactions of the South London Entomological and Natural History Society, 1958-59. (Published November, 1960.) pp. xlvi; 239. With 10 plates (2 coloured). Price £1 0s. 6d.

Browsing through past issues of this journal it is interesting to note the number of reviewers who have run out of superlatives in describing this annual volume. We have come to expect a very high standard, and we are seldom disappointed. The Transactions contain a number of excellent papers which we have space only to mention briefly.

The Malayan Gliding Reptiles, by M. W. F. Tweedie, is particularly welcome, and will in some measure satisfy those members who, quite justifiably, criticise the society for ignoring the second half of its title. The photographs illustrating this article are very fine, but the purists will no doubt quibble about the title of the article, as the author includes Amphibia as well as Reptiles.

The Catalogue of Books in the Library, by A. T. R. Eagles and F. T. Vallins, is a well laid out compilation which will be highly appreciated by anyone who, through personal experience, knows just how difficult it is to do this sort of thing well.

A Naturalist in the Kingdom of Kerry, by H. C. Huggins, gives an interesting and comprehensive bird's-eye view of the natural history of the region, illustrated with a useful map.

A. E. Gardner's Report on the Insects collected by the E. W. Classey and A. E. Gardner Expedition to Madeira in December, 1957, gives a fascinating account of the island, and the list of species is a graphic illustration of the amount of work that two able field entomologists can get through in a very short space of time.

The volume is concluded by *Larvae of the British Lepidoptera not figured by Buckler*, by G. Haggett. This is the fourth part of a series which speaks for itself by its accuracy and the quality of the coloured plates which illustrate it.

Altogether it is difficult to avoid repeating the words of a previous reviewer—. . . 'at its price there can be few better purchases for the amateur than this volume'.

A. EVE.

The Monarch Butterfly, by F. A. Urquhart (Toronto University Press; Oxford University Press, London). pp. xxiv + 361; 79 text figures, 12 coloured plates. Price in G.B. £2 12s.

For many years all workers in the field of Insect Migration have been hoping that definite results could be obtained by marking individuals and recovering sufficient numbers at a distance from the point of release to confirm some of our theories. This technique has for years been one of the mainstays in the study of bird migration, but until now any results from marking butterflies have been almost negligible.

In this new book Urquhart gives the first full account of his many years' experiments in marking Monarch butterflies (*Danaus plexippus*) in North America, with details of recoveries of tagged individuals up to nearly 1,900 miles from the point of release. This alone makes it an outstanding event in Entomology.

His book, however, covers a much wider field, and almost every entomologist will find in it something of interest. It consists of two parts; the first, covering about ninety pages, is a general survey of the life cycle of the Monarch; the problems of the distribution of its food-plant, Milkweed; its migrations; and its relation to certain problems of mimicry. This portion is illustrated by excellent photographs and some coloured plates. It forms an excellent outline of the biology of an insect.

The remainder of the book gives in detail the experiments and observations on which the author's conclusions have been based. It is to a certain extent a recapitulation of much of the first part on a more extensive scale. There is a table showing the distribution of the different species of Milkweed (*Asclepias*) in the States and Provinces of North America, with notes on those which are known to be eaten by the larvae. There is full information about the rate of growth; the attachment of the pupa to the silk pad made by the larva; the time of day for the emergence of the adult; its mating habits; egg laying; number of generations in different parts of the country, and many other problems. Another chapter discusses the distribution of the three main races, *D. p. plexippus* in North America and much of Central America, *D. p. erippus* in South America south of the Amazon, and *D. p. megalippe* in the area in between. This is illustrated by a map on page 43 which, I think, extends the distribution of *erippus* considerably too far to the south.

There follow notes on the changes in abundance of the butterfly in North America from 1955 to 1958; on parasites and predators; and a fuller discussion on the mimicry problem. On this point Urquhart is critical of the 'Batesian' explanation, and states that the fundamental assumption that the Monarch is distasteful is not supported by his own personal experience. On eating a number he found them to be quite tasteless. This section ends with about 35 pages on the anatomy of the butterfly.

From page 252 to the end of the book he returns to the subject of migration, and gives tables and maps showing a large number of recoveries at a distance of butterflies marked at several different localities. Unfortunately he does not give even a rough estimate of the total number marked, so that we might have an idea of the percentage of successes. Perhaps this is due to the fact that the method of attachment of the tags of the wings (marked with a registration number and 'return to Toronto Museum') was continually being improved. To summarize his results, he records 115 recoveries of which 44 were at less than 14 miles from the point of release. Those recovered at greater distances are best considered in two

groups; first, those marked in the late summer and autumn to study the southward migration; and secondly, those marked in the spring to study the northward movement. The autumn recoveries, which were the most numerous, included 39 between 15 and 120 miles away; 38 between 120 and 1,000 miles; and eight at over 1,000 miles. The most distant recovery was one marked in Ontario on 18th August, 1957, and recaptured in San Luis Potosi, in Mexico, on 25th January, 1958, a distance of 1,870 miles!

In the spring flights the maximum recovery distance was 600 miles, with nine others at over 100 miles, and four between 15 and 100 miles. The one thing we need now to confirm our theories on the migration of the Monarch is an individual marked in the north one fall and recaptured there in the following summer.

A final note will give some idea of the author's practical approach to his problems. Some years ago I discussed with him the validity of a number of reported observations of butterflies settling on the surface of a lake or even the open sea, and then taking off again. He was inclined to doubt if a butterfly could rise again once it had touched the water. In this book he recounts some experiments in which he held Monarch butterflies in his closed hands and released them about a foot below the level of the water in a lake. Nearly every one, unless damaged in the process, was able to take off without difficulty when it reached the surface.

The book is most interesting and stimulating, and should be bought by all who can afford it.

C. B. WILLIAMS.

Hong Kong Butterflies, with Notes and Comments by Major J. C. S. Marsh, R.A., F.R.E.S. Published by the Shell Company of Hong Kong Ltd., 1960. pp. viii; 113. Sm. 4to. 34 coloured plates. Price in G.B. £1 12s. 6d.

A prospective reader of this very well produced book might be misled by the too modest designation 'Notes and Comments' applied in the title to Major Marsh's text. He is economical with words, but manages to give an account of the early stages (where they are known), distribution and status in Hong Kong of all the 184 species of butterflies recorded from the colony. His introduction is brief and he describes collecting and preserving methods perhaps barely adequately, but many users of a book of this kind will have acquired these techniques already. On the other hand he includes instructions for the practice, hardly ever seen now in Britain, of transferring the scales of butterflies' wings by pressure to waxed paper. This is considerably more difficult and laborious than setting and (as described here) will not do for species with structural coloration because the scales adhering to the paper are upside-down. A blue Lycaenid will present a leaden grey appearance when prepared in this way, and its only advantage is that your collection is more easily stored.

The author is wise, I think, to confine himself to the scientific names. There is an English nomenclature for Oriental butterflies derived from the days of the British Raj in India. It is a curious medley of Viscounts, Mormons, Sergeants, Crows and Bluebottles, and is nowhere in general use.

All but twenty of the species are illustrated at life-size in colour on 34 plates. The figures are reproduced by a photographic process direct from specimens. While this means that when only worn specimens are available their condition cannot be disguised, the result obtained is generally better, from the point of view of the collector who wants to identify butterflies, than illustrations made from paintings. Certainly these plates leave little to be desired; their quality is not quite uniform throughout the copy of the book which I have seen, but at their best they are excellent.

The printing of both text and plates was done in Hong Kong, and Ye Olde Printerie Ltd. and the South China Photo-Process Printing Co. are to be congratulated together with the author and the publishers on a very handsome and useful book.

M.W.F.T.

AN EARLY RECORD OF *PLUSIA GAMMA* L. (LEP.)

On the night of Wednesday, 22nd March, 1961, I took a specimen of *Plusia gamma* L. in my m.v. light trap. Upon examination the specimen was found to be a male in absolutely mint condition, with crests and fringes complete. When slight pressure was applied to the abdomen a small drop of meconium was exuded.

These facts, the early date of capture coupled with the condition of the insect, seem to point to it being freshly emerged and having over-wintered here in some form. The winter of 1960-61 was of course exceptionally mild, with very little hard frost in the area.

It would be interesting to know if other examples have been taken in the area in a similar condition, and whether there is any evidence of an immigration having taken place in March.

P. H. WARD.

Whetstone, Herts.
